

MODERN Machine Shop

NOVEMBER, 1952

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Hardness Testing

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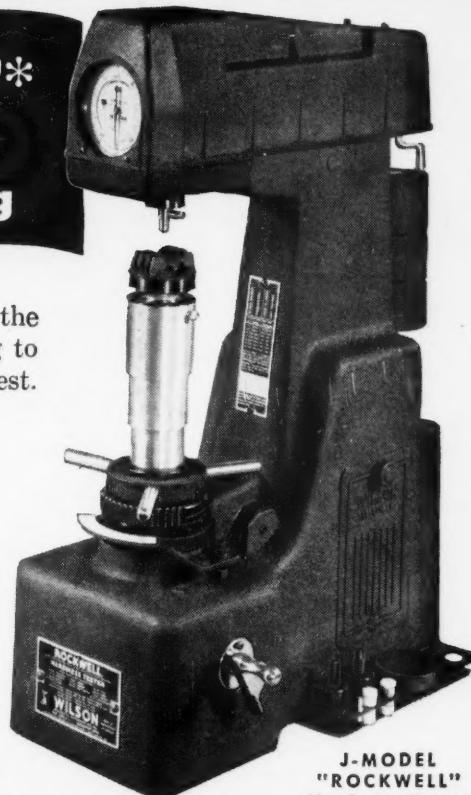
TUKON

Microhardness Testers

ACCESSORIES

Write for information today

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"ROCKWELL"
Hardness Tester

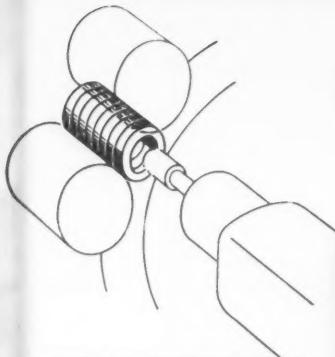
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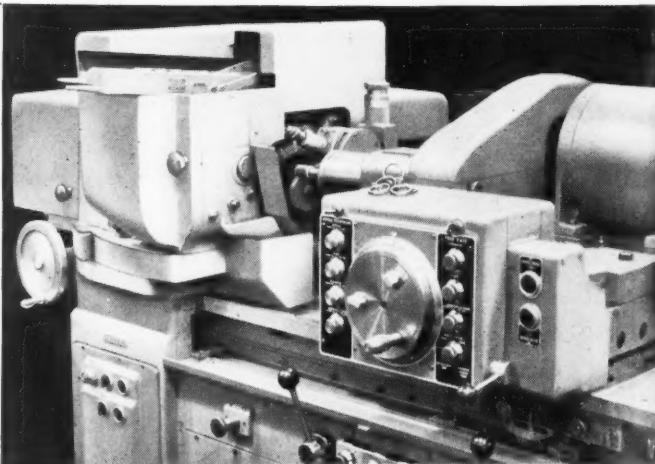
WILSON

MECHANICAL INSTRUMENT DIVISION
AMERICAN CHAIN & CABLE

230-G Park Avenue, New York 17, N. Y.



Here's how the Heald handles a multiple grinding job



valve seat inserts ground

8 AT A TIME

on a Heald Model 281 Centerless

With this fully automatic Heald Centerless Internal, valve seat inserts are ground eight at a time. The parts are stack loaded and drop into grinding position automatically, where they are located and rotated between the support, pressure and regulating rolls. Since they are rotated on their own outside diameter, concentricity between ground bore and O.D. is easily maintained. Size-Matic sizing is also fully automatic. Once the machine is started, all the operator has to do is keep the loading chute filled and remove the finished parts from the unloading chute.

This is typical of the high production efficiency that you can get with a Heald Centerless Internal. Remember — when it comes to precision finishing, it pays to come to Heald.



*Heald precision speeds
the nation's production*

THE HEALD MACHINE COMPANY

WORCESTER 6, MASSACHUSETTS

Branch Offices: Chicago • Cleveland • Dayton • Detroit • Indianapolis • New York

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Member



MODERN Machine Shop

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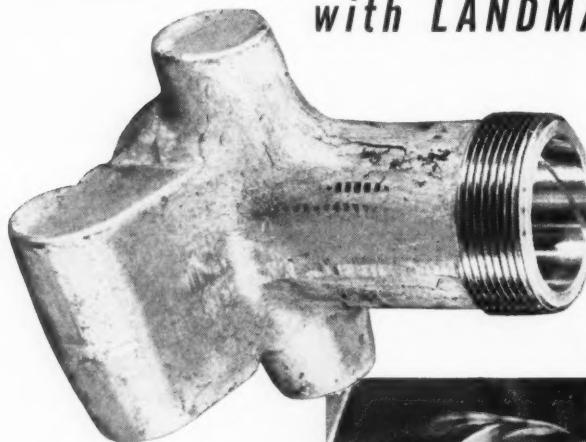
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GOOD LEAD ON THREADS

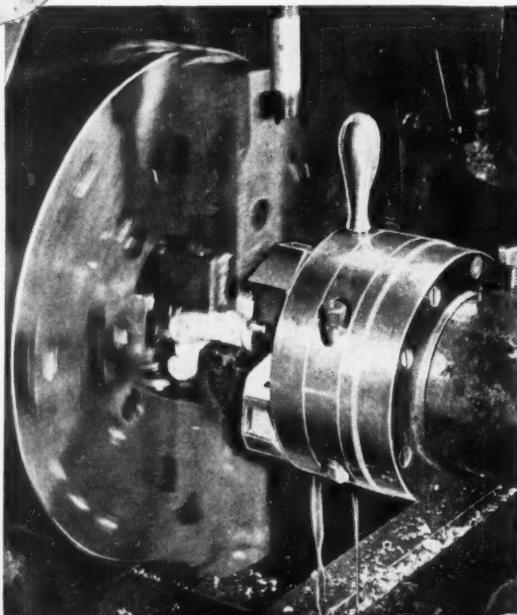
with LANDMATIC HEADS



The permanent nut action of Landis Tangential chasers assures accurate pitch threads throughout these crown port closing bodies used in bottling machinery. Landmatic Heads using Landis Tangential chasers cut $1\frac{5}{8}$ " 16 pitch USS threads $\frac{1}{2}$ " long on naval bronze forgings at the rate of 50 SFM. Actual threading time is about 5 seconds.

The permanent throat feature of the chasers maintains initial cutting accuracy throughout the entire life of the tool. When the chaser is reground, no grinding is done on the throat. Thus the throat angle and nut action is never altered and enables the chaser to consistently produce threads accurate for lead. For further information, on Landis Die Heads & Tangential chasers, write for Bulletins F-80, F-90 & A-50.

These photographs were taken in the Machine Manufacturing Division of the Crown Cork & Seal Company, Inc., Baltimore, Maryland.

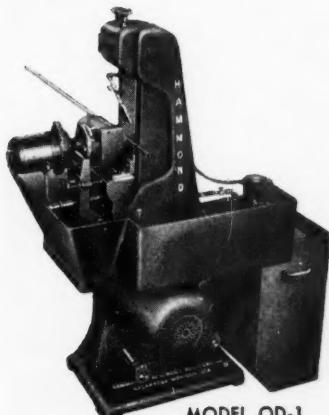


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DEBURR
POLISH
BUFF**



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**TUBES, RODS, BARS
AND OTHER CYLINDRICAL
SHAPES... PLUNGE CUT
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SEND SAMPLES...

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MODEL OD-9

Hammond Machinery Builders
INC

1615 DOUGLAS AVENUE

KALAMAZOO, MICHIGAN

New • Fast • Proven

LOW COST

**methods for
PERFORATING
and NOTCHING
SHEET METALS**

Whistler MAGNETIC Dies

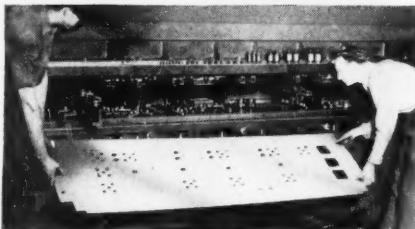
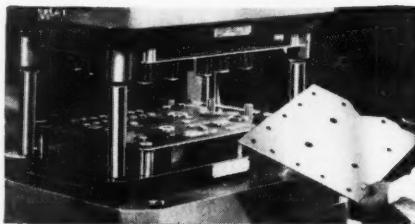
at work in large inclinable press. Magnetized retainers hold the units. No bolting required. A fast, economical method in making up a punch and die set for short or long runs. All parts re-usable.

Whistler ADJUSTABLE Dies

on perforating and notching job, using Tee slotted die set. With Whistler Adjustable Punch and Die units production starts within hours instead of weeks. Last minute job changes made quickly.

REDUCE DIE COSTS

All units and parts are interchangeable and used repeatedly in different arrangements. **INCREASE PRESS PRODUCTION—Down time is minutes as compared to hours for change-over.** For precision work in all types and sizes of presses. **START PRODUCTION AT ONCE.** Pierce materials up to $\frac{1}{4}$ " thick mild steel. Standard sizes and shapes available up to 3 inches. Special sizes to order.



● Here are the complete details with prices and application illustrations. Send for these catalogs. No obligation.

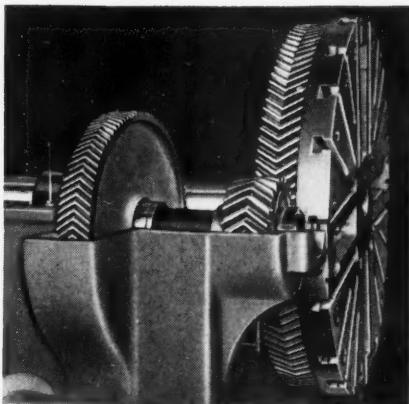
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S. B. WHISTLER & SONS, Inc.
Adjustable, Magnetic, Custom and Cam Dies for all Industry
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Huge, Rebuilt Lathe operates *Smoother Faster* with Farrel® Gears

In rebuilding a giant, 100" lathe, Simmons Machine Tool Corporation, of Albany, N. Y., used Farrel-Sykes herringbone gears to replace spur gears on the two final gear reductions.

With these new gears, Orange needle bearings for the shafts and a pressure lubrication system, Simmons was able to double the normal spindle speeds of the machine. On test, they found the rebuilt lathe to be "exceptionally smooth and quiet in operation."

The quiet, vibration-free performance of Farrel-Sykes gears results from extreme accuracy of tooth spacing, contour and helix angle, and other qualities inherent in the Farrel-Sykes method of gear generation. They are made of the finest grade materials, in a complete range of sizes.

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FB-783

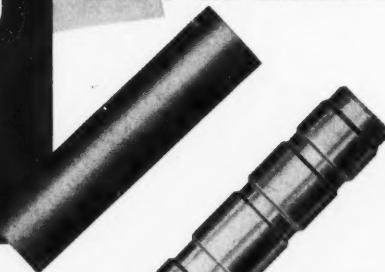


NOW!
Crush Dressing

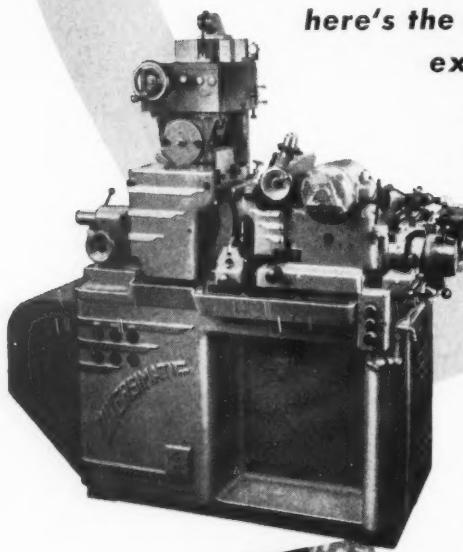
enables you to
centerless grind small,
profiled parts

from the **SOLID**

here's the blank...



**here's the centerless ground piece,
exactly shaped and sized!**



RESULT: Faster production of precision parts formerly made on screw machines and automatics!

If you want fast, accurate profiling, if you want to save roughing time—look into centerless grinding on a DIVERSIMATIC! Grinds many shapes right from the solid, eliminates warpage from heat treat, produces close tolerances and excellent finish, with better output!

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FULL FACTS!**

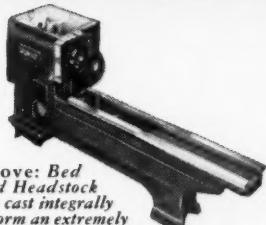
Write for
quotation and
delivery!

**ASK FOR THIS
NEW FOLDER**



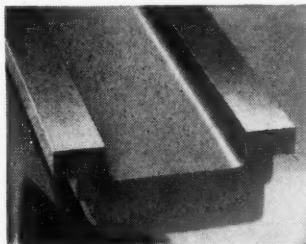
**DIVERSIFIED
METAL PRODUCTS CO.**

5125 Alcoa Avenue, Los Angeles 58, Calif.



Above: Bed and Headstock are cast integrally to form an extremely heavy unit and to provide the rigid foundation for all types of work.

Below: Block type ways are straddle keyed to the bed and ground in perfect alignment with the spindle. All working surfaces are hardened to 64-66 Rockwell "C".



ACCURACY that doesn't "wear off"

Here are two good reasons why you can count on the accuracy of Gisholt Turret Lathes—now and years from now.

One-piece bed and headstock, cast as a heavy, rigid unit, reduce distortion and vibration to a minimum. Headstock is jig-bored to insure—and maintain—perfect alignment of spindle and drive shafts, with ample metal to provide the most solid support possible.

Hardened steel ways are augmented by hardened steel strips secured to the ram saddle, as well as hardened steel gibs and clamps, making an assembly that is virtually wear-proof. Its accuracy is further preserved by force lubrication.

These advantages are yours for the long life of any Gisholt Turret Lathe. Ask for complete details.

THE GISHOLT ROUND TABLE represents the collective experience of specialists in the machining, surface-finishing and balancing of round and partly round parts. Your problems are welcomed here.

GISHOLT

MACHINE COMPANY

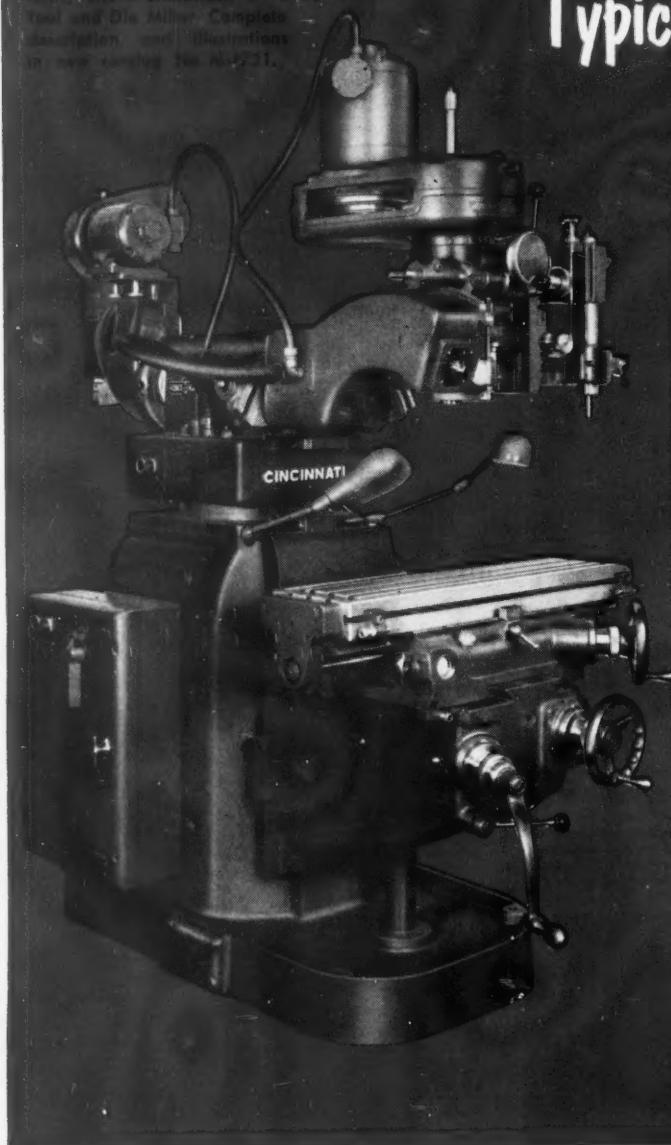
Madison 10, Wisconsin



TURRET LATHES • AUTOMATIC LATHES • SUPERFINISHERS • BALANCERS • SPECIAL MACHINES

Typical Dies

Die sets, dies and tools to machine
sheet metal, metals, brass, metal
alloys, etc.—CINCINNATI
Tool and Die Millers. Complete
description and illustrations
in new catalog No. A-21.



FORGING DIE

40 hours

PLASTIC MOLD

30 hours

DIE CASTING DIE

18 hours

EMBOSSING DIE

12 hours

GLASS MOLD

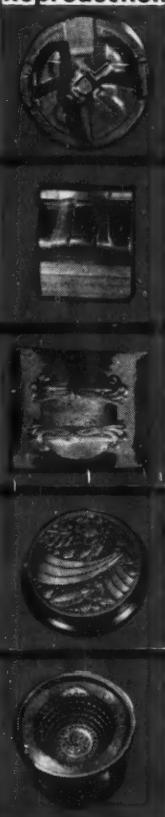
14½ hours

and Molds Milled on Cincinnati 8"x18" Tool and Die Miller

Master



Reproduction



Do you make dies and molds like those illustrated here? All are examples of the low-cost work performed by CINCINNATI 8" x 18" Tool and Die Milling Machines. Note the perfect likeness of the reproduction to the master; they were not hand finished prior to photographing, nor were the photos retouched. Features of the 8" x 18" which are responsible for the excellence and low cost of this type of work include sensitive, light pressure automatic depth tracing unit . . . double swivel adjustment for spindle head . . . full 8" x 18" cutting area in one setting . . . anti-friction feed screws and nuts. Complete data may be obtained by writing for a copy of our new catalog No. M-1731.

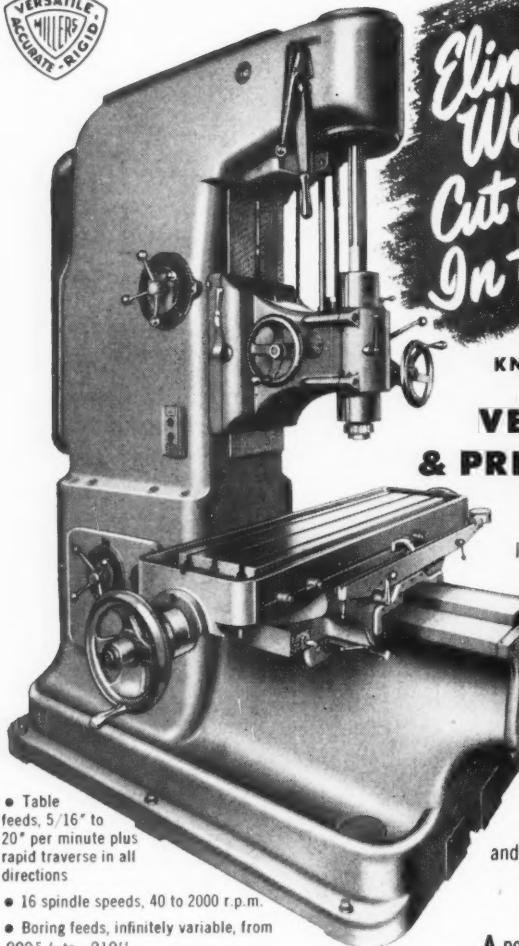
THE CINCINNATI MILLING MACHINE CO.

CINCINNATI 9, OHIO



CINCINNATI

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MACHINES • METAL FORMING MACHINES • FLAME HARDENING MACHINES
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*Eliminate Work Transfers!
Cut Set-up Time
In Half!*

**NO.
KNIGHT 50 FOR
VERTICAL MILLING
& PRECISION BORING**

More production —faster—with less labor and lower cost! This accurate, versatile and rugged solid-base No. 50 is now doing the work of 2 or more machines in hundreds of busy plants!

The No. 50 incorporates every essential feature for handling an extremely wide range of difficult boring and vertical milling jobs with production-line speed and toolroom precision. Time-wasting work transfers are completely eliminated—set-up time is reduced to half or less!

A powerful 7½ H.P. all-gear motor provides power to spare for the toughest jobs. Convenient quick-action controls and full-vision work areas make operation easy and effortless.

ATTACH TO COMPANY LETTERHEAD

W. B. KNIGHT MACHINERY CO.
3922 W. Pine Blvd., St. Louis 8, Mo.

Send details on No. 50 and other Knight milling machines.

NAME _____

TITLE _____

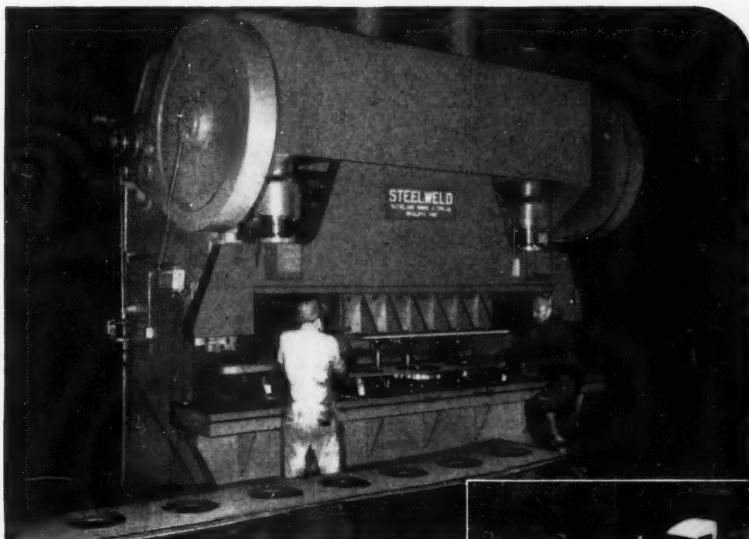
Send information on Knight 20° and 42° Power-Feed Rotary Tables

Mail Coupon For Details

W. B. KNIGHT MACHINERY CO.
3922 WEST PINE BOULEVARD • ST. LOUIS 8, MISSOURI

Punches 15" Holes For Warner & Swasey Gradalls

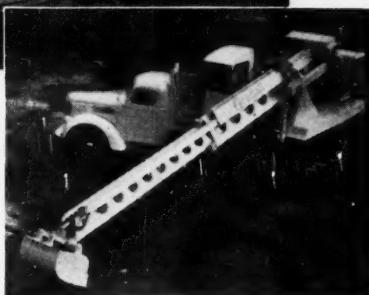
Also Performs Bending and Flanging Operations



Practically all of the steel plate on Warner & Swasey Gradalls, manufactured at their New Philadelphia, Ohio plant, is formed, punched and flanged on a Steelweld Press which is designed to brake steel plate up to 16' x $\frac{1}{2}$ ".

One of the more interesting jobs done on this machine is the punching of 15" diameter holes in Gradall boom plates, followed by a flanging operation. Through use of special movable punches, many smaller holes of various sizes are made at a time, in locations as desired.

The versatility of Steelweld Presses to handle efficiently many varied operations has proven of tremendous advantage to many users. You, too, may find the many features of these machines of great help. A representative will be glad to give you the details.



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CATALOG No. 2010 gives
construction and engineering
details. Profusely illustrated.

THE CLEVELAND CRANE & ENGINEERING CO.

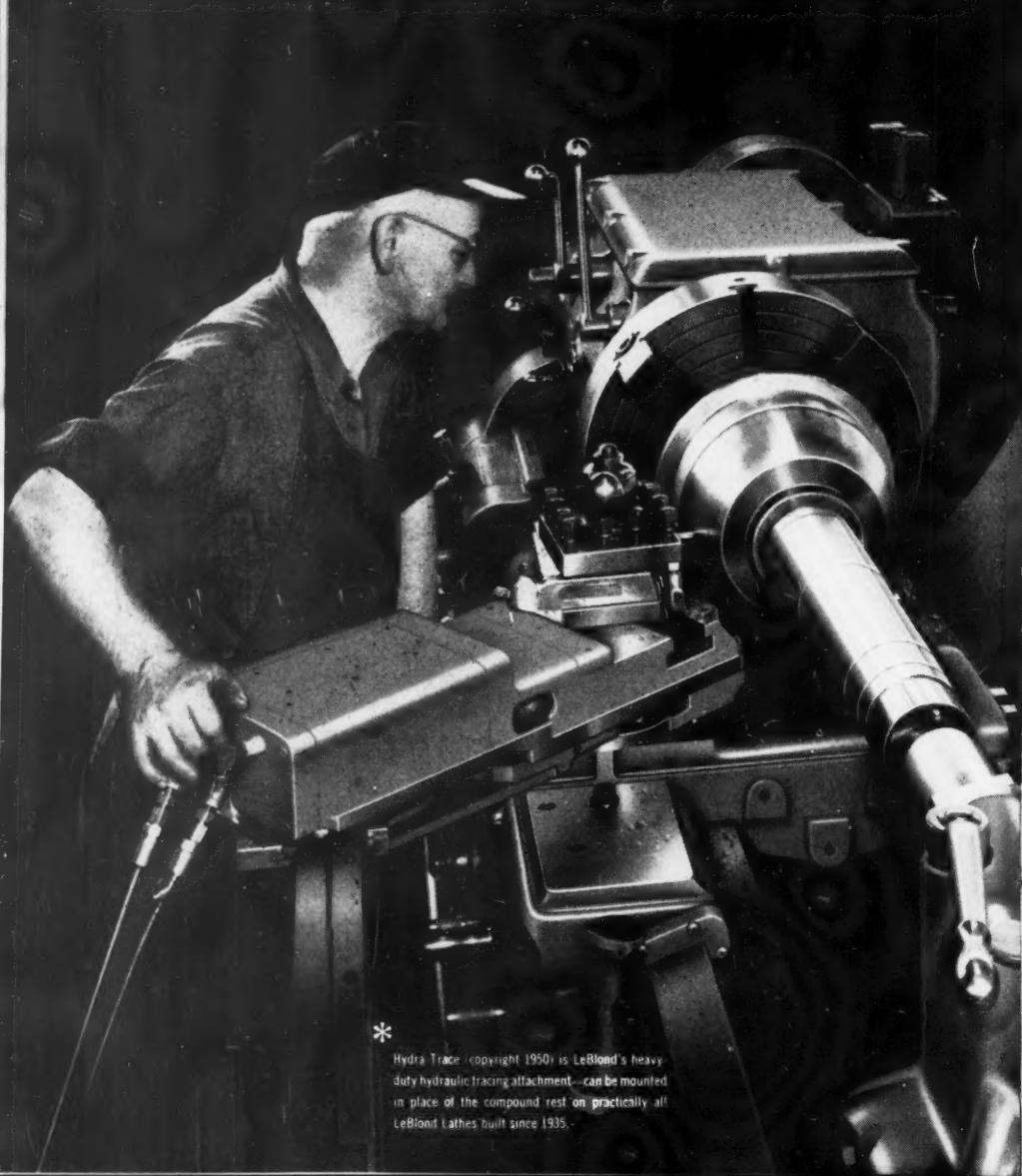
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BRANDING • FORMING • BLANKING • DRAWING • CORRUGATING • PUNCHING

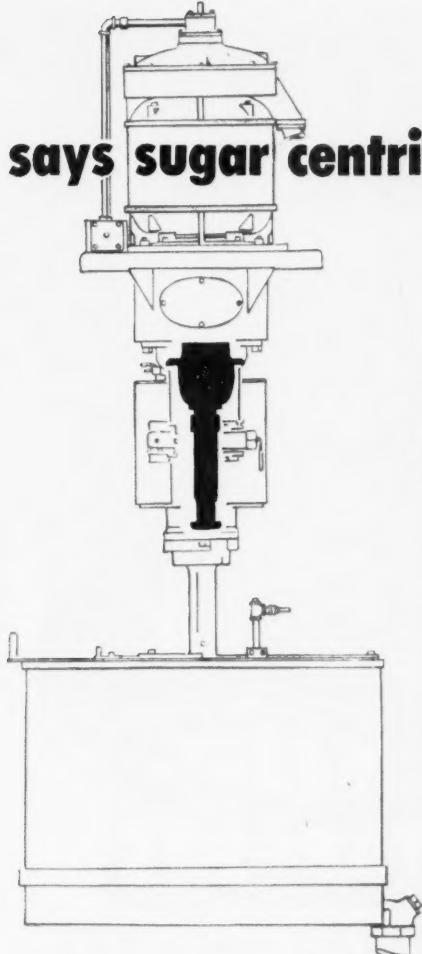
*

"sweet is the name for HYDRA-TRACE"



*

Hydra Trace (copyright 1950) is LeBlond's heavy duty hydraulic tracing attachment - can be mounted in place of the compound rest on practically all LeBlond Lathes built since 1935.



says sugar centrifugal manufacturer

turning time cut 60%
on contoured 3-step shaft

Centrifugal machines made by The Western States Machine Co. of Hamilton, Ohio are used in all corners of the world for the processing of sugar. Three years ago, this company had to speed up machining methods.

One important part, a contoured 3-step shaft—called a "ball and quill"—carries the thrust of the basket as it spins at 1800 rpm. The ball allows the basket to shift slightly, compensating for unbalanced loads. This part was first produced in the usual manner, which included turning the contour with a radius attachment, followed by tedious file finishing.

Then, on the recommendation of LeBlond's Cincinnati Distributor, E. A. Kinsey Co., a Hydra-Trace unit was installed on a 16" LeBlond Heavy Duty Lathe. The result was "sweet"—turning time cut 60%!

Sweet, too, were the other benefits of Hydra-Trace. No need for highly-skilled operators. Flat templates, made quickly, stored easily. Short set-up time. Heavy-duty capacity. Many more.

See how you can reduce to hours and minutes tracing jobs formerly measured in weeks and days. Ask your distributor or write us direct for the rest of the story on Hydra-Trace.

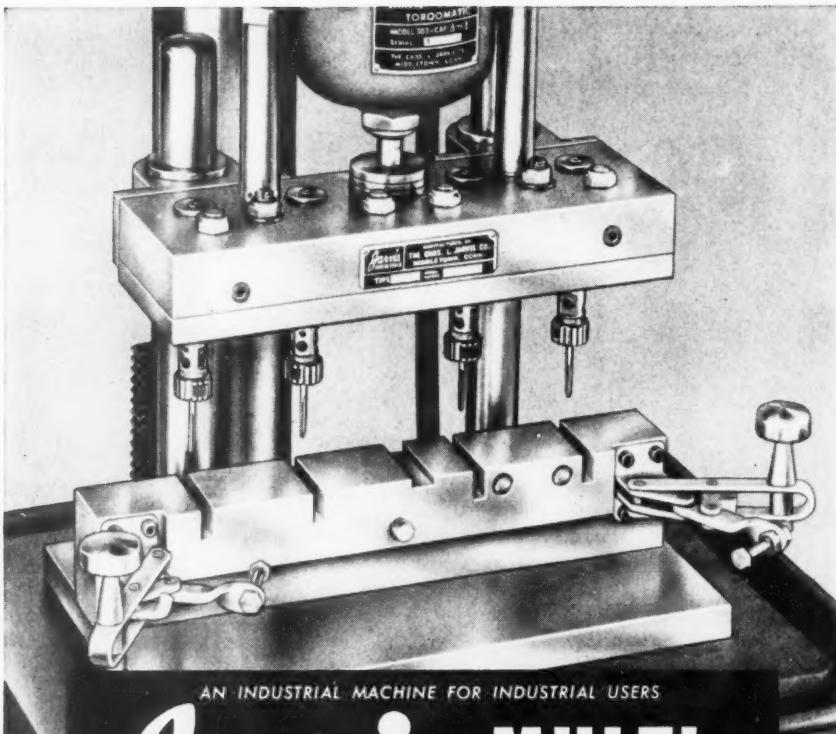
THE R. K. LEBLOND MACHINE TOOL COMPANY, CINCINNATI 8, OHIO

Ask for bulletin HT2E
for complete details on
LeBlond Hydra-Trace

turned faster by



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AN INDUSTRIAL MACHINE FOR INDUSTRIAL USERS

Jarvis **MULTI-TAPPERS**

for **MULTI-TAPPING AND DRILLING**

We invite you to consult with the factory-trained Jarvis representative in your territory to analyze and determine the full requirements of your tapping and drilling needs. Write for catalog.

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REAMERS AND MILLS • DRILLS • BORING BITS

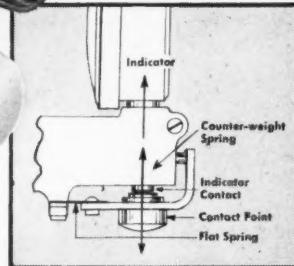
THE CHARLES L. JARVIS CO., MIDDLETOWN IN CONNECTICUT

Side Thrusts and Friction Don't Affect this



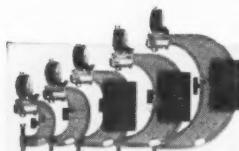
SNAP GAGE

*Because the Dial Indicator is free
... while measuring the dimension*



UNAFFECTED BY SHOCKS AND FRICTION

The flat spring supporting the contact point takes all the shocks and side thrusts — the indicator contact point merely rides on the gage contact point. There is no tendency for the indicator spindle to bind. Counter-weight spring offsets weight of gage and of inspector's hand.



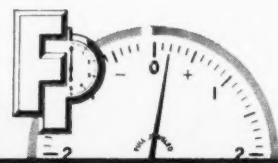
Model 1000 P-1 (0" to 1")
Model 1000 P-2 (1 $\frac{1}{2}$ " to 2")
Model 1000 P-3 (1 $\frac{3}{4}$ " to 3 $\frac{1}{4}$ ")
Model 1000 P-4 (1" to 4 $\frac{1}{2}$ ")
Price, any one gage with .0005" grads, \$57.50
Price, any one gage with .0001" grads, \$75.00
Larger sizes special

FEDERAL MODEL 1000 SERIES GAGES show you the amount of error so you can make corrective adjustments before you begin to produce scrap. Measurements are not influenced by "feel" and any operator obtains the same reading. These gages are fast, lightweight, and more accurate than conventional "go, no-go" gages.

Five gages enable you to inspect *all* dimensions from 0" to 6". There are no extra gage costs when size requirements change — Adjustments can be made easily with a screw driver! Write for folder on these modern gages. Federal Products Corporation, 1411 Eddy Street, Providence 1, R. I.

FEDERAL

Largest manufacturer devoted exclusively to designing and manufacturing *all types* of DIMENSIONAL INDICATING GAGES



Fast Cutting Gardner Abrasive Disc Saves Valuable Contract



Today, it's the engineering service behind the abrasive disc that counts in cutting costs and increasing output. Gardner Abrasive engineers help you keep costs down by fitting the abrasive to the job. This case history shows how a large company benefited from Gardner service and abrasives.

For help in cutting costs and increasing output of your disc grinders, call the Gardner engineer nearest you. Write for a copy of the Gardner Abrasive Guidebook for better grinding results. It's free.

PROBLEM

To increase disc grinding production in order to meet delivery requirements of an important contract.

JOB DATA:

Grinder: 16" Double Spindle Disc Grinder
Work Piece: Metal Washer 2½" O.D. x ¼" Thick
Material: Steel Stamping, Hardened
Stock Removal: Up to .015" over-all
Tolerances: Within .001" for parallel

GARDNER RECOMMENDATION

- (1) Add additional coolant tank to grinder
- (2) Suggested using No. 80A60 grain Yellow-Rim Discs with DCS corrugations

RESULT

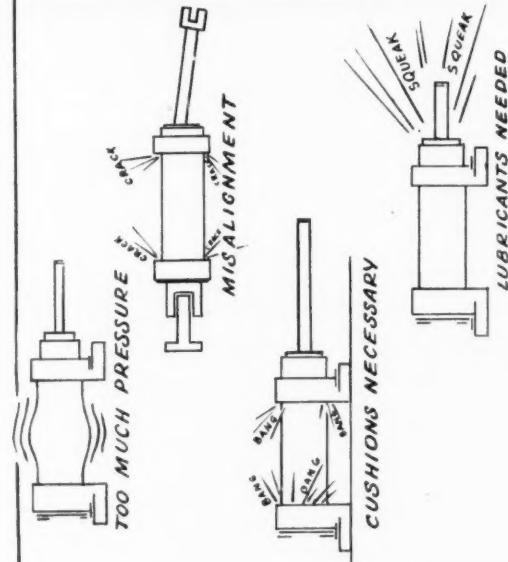
Output increased 50% over former production due to heavier cuts made possible with this fast, cool-cutting Gardner disc.

GARDNER MACHINE COMPANY
428 Gardner Street, Beloit, Wisconsin

106AS

GARDNER
abrasive
discs

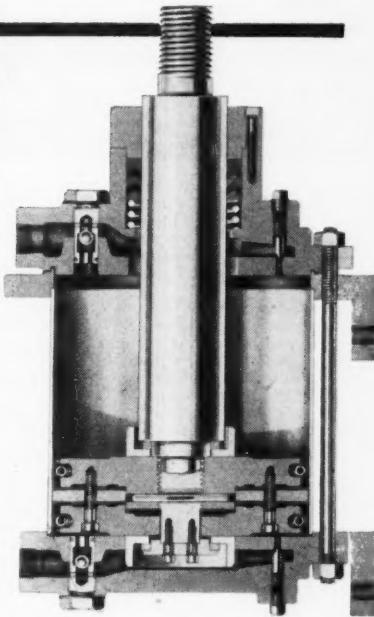
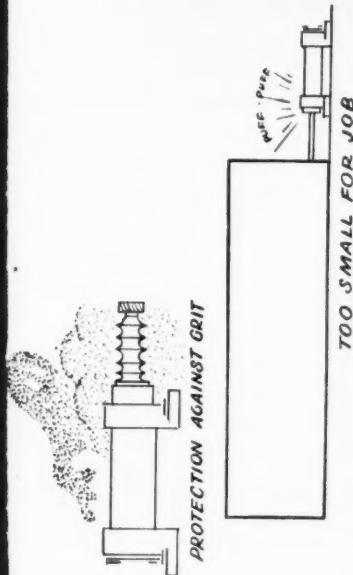
How your CYLINDERS can Last Longer



WHEN YOU INSTALL an air cylinder you want to insure the long life and trouble-free performance for which the cylinder was designed. Cylinders of ample capacity for the job should be used . . . Operating pressure should not exceed maximum cylinder rating. Trouble is often caused by use of the improper cylinder mounting style and by the piston rod being incorrectly aligned with the load to be pushed or pulled. Where the atmosphere contains moisture or abrasive dust, piston rod protective boots are desirable. Speed control valves in the air line may be necessary, particularly in moving high inertia anti-friction loads horizontally. Standard cushions, or even "super" cushions may be needed. Filters and lubricators are desirable.

WHEN YOU INSTALL a HANNA® Air Cylinder you have the *best* assurance of long cylinder life . . . you have consistently efficient performance . . . you have minimum maintenance. Hanna Cylinders combine such important features as removable bronze check valves, piston-packing expander rings, floating bronze cushion sleeves, self-adjusting, spring-backed rod packings and two-piece threaded flange and head construction.

YOUR BEST GUARANTEE of carefree cylinder operation is your specification of Hanna Cylinders followed by correct installation. The Hanna Cylinder and Valve Line has sufficient breadth to best meet your particular power needs. Send for free copy of Bulletin 255 showing Hanna Cylinder Power in Action!



Hanna Engineering Works

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1758 Elston Avenue, Chicago 22, Illinois



"It didn't take me long
to learn - **MORSE**
means the End of All
END-MILL Problems"

They catch on fast — this new generation of up-and-coming production men. And one of the first things they learn is the fact that Morse Cutting Tools . . . supplied by competent Morse-Franchised Distributors . . . mean substantial savings all along the line, in time, trouble and money.

Take End Mills, for instance. What do you need? Here are all types of short or standard mills, single or double-end. Also, types with left-hand spiral but right-hand cut to push chips ahead . . . ball-end for die cavities, fillets, and round-bottomed holes or slots. Here are two lip styles with single or double-end, for plunge-cutting. Here are taper shank styles you

can use direct in machine spindles. And here's the old reliable shell design, for face or slab milling. Not to mention a wide range of lengths in Morse's exclusive Hi-Helix shear-cutting design.

From among all these, you can get exactly the right mill for your job from your Morse-Franchised Distributor. You can profit from his full experience and full line of Morse Cutting Tools. Call him in, today.

MORSE TWIST DRILL & MACHINE COMPANY
NEW BEDFORD, MASS.

(Division of VAN NORMAN CO.)

Warehouses in New York, Chicago, Detroit, Houston, San Francisco

MORSE

...buy them by phone from your Morse-Franchised
Distributor and save ordering time



Cutting Tools

November, 1952

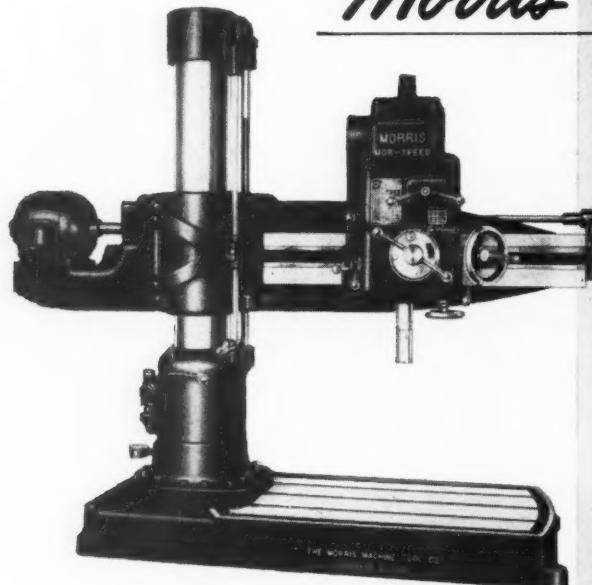
MODERN MACHINE SHOP 21



drill....ream....tap....FASTER, EASIER!

Morris

MOR-SPEED
RADIAL DRILLS



Designed to set a cost-killing pace in the race for profitable production, MORRIS Mor-Speed RADIAL DRILLS offer a long list of outstanding features:

- * Centralized Controls—Reduce time between cuts.
- * Variety of Speeds and Feeds—Better selection of the right combination for every job.
- * Automatic Lubrication—Saves wear, insures accuracy.
- * Greater Strength, Rigidity and Balance—Provide greater machining precision.
- * More Automatic Stops—Save time and reduce manual control.

If you're interested in removing metal faster, write for your copy of the new MORRIS Mor-Speed RADIAL DRILL catalog.

a better
product
at less cost
with precision
PLUS production

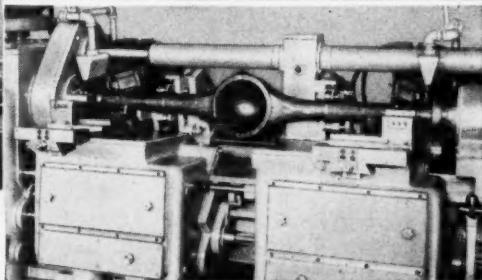
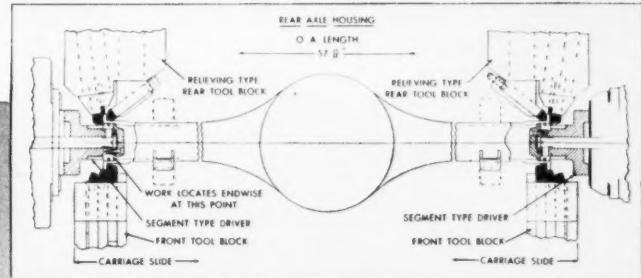
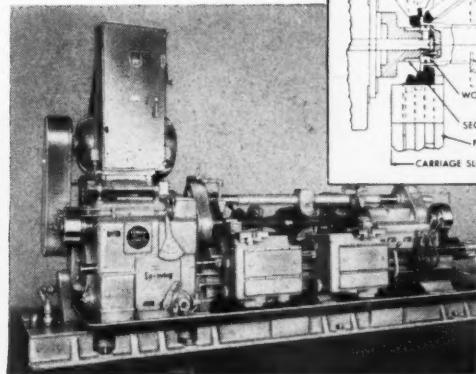


Morris

THE MORRIS MACHINE TOOL COMPANY, 934 HARRIET ST., CINCINNATI 3, OHIO

MACHINE OF THE MONTH

PREPARED BY THE SENECA FALLS MACHINE CO. "THE Lo-swing PEOPLE" SENECA FALLS, NEW YORK



MODEL "AR" Lo-swing WITH DOUBLE END DRIVE CUTS MACHINING COSTS ON REAR AXLE HOUSING

Problem: To turn and face both ends of Rear Axle Housing simultaneously.

Solution: The Model AR Automatic Lo-swing Lathe selected for this job was equipped with a Double End Drive to secure a balanced, efficient drive and prevent torsional deflection of the Axle Housings while under cut. The right-hand Head of the Double End Drive Mechanism is a massive, two-piece unit securely clamped to the ways of the bed. Its top part slides on large bearing surfaces and is pneumatically-operated to facilitate loading and unloading of the work. The large diameter drive shaft for this head is splined to permit free longitudinal movement of the sliding member, and is supported with a central bearing.

The close-up view above shows details of the tooling and also the two spring-loaded vibration dampeners which prevent vibration of the out-of-balance part when revolved at high speed. This view also shows the two front carriages; the left-hand carriage feeds towards the headstock while the right-hand carriage feeds towards the

tailstock. The mechanism for reversing the feed on the right-hand carriage is enclosed in the housing shown on the extreme right-hand end of the bed in the overall view above.

The axle housing is driven with two pneumatically-operated expanding segments...the air operating cylinders being mounted directly on the right and left hand Driving Head Spindles. Details of the tooling are shown in line drawing.

The operating cycle consists of loading the Axle Housing in two cradles, after which the sliding member of the right hand head advances and locates the housing endwise in relation to the driving chucks. This first movement is controlled by a four-way air valve at the right hand end of the machine. The second movement of this valve closes the two driving chucks. The machine is then started with the main clutch control lever located on the right side of the right-hand carriage, which is the normal operating position.

The automatic machining cycle then takes place and the machine stops automatically at the end of the cycle, ready for unloading and reloading.

Consult Seneca Falls Engineering Staff on your turning problems.

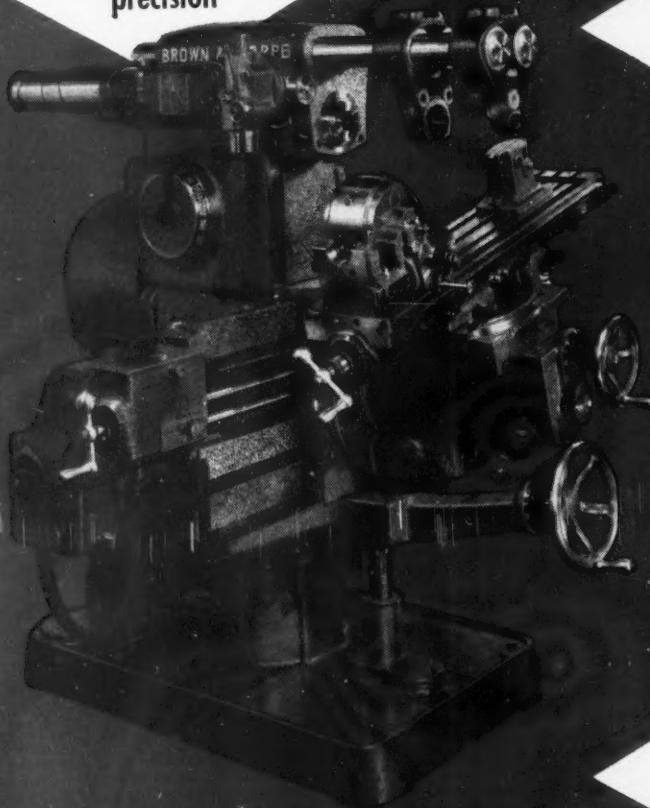
SENECA FALLS MACHINE CO., SENECA FALLS, N. Y.

PRODUCTION COSTS ARE LOWER WITH Lo-swing

B-S

Productioneered

for extreme versatility
and high
precision



NO. 0 OMNIVERSAL MILLING MACHINE

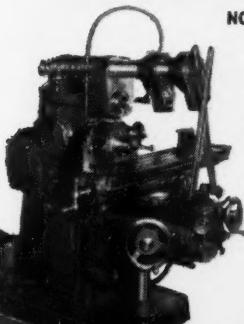
The flexibility of this machine equips you to meet the widest variety of change-overs quickly and easily. It's "Productioneered" to keep your work-flow in toolrooms, experimental departments, and research laboratories at a continuously high level. Work may be milled in a number of planes, or drilled, bored, or reamed at many different angles without relocating work in holding devices. Write for details.

Brown & Sharpe Mfg. Co., Providence 1, R. I., U. S. A.



Productioneered for adaptability to unusual or ordinary jobs

NO. 2 UNIVERSAL MILLING MACHINES, 3 H.P. or 5 H.P.

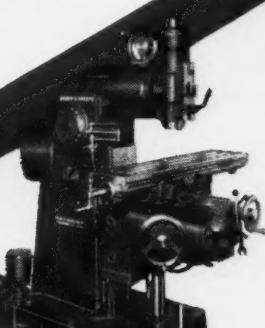


Brown & Sharpe Universals equip you for continuous high level production. "Productioneered" features include: tri-motor drive, quick speed and feed selection, time-saving controls, and exclusive extended spindle face.



Productioneered for versatile vertical milling

NO. 2 VERTICAL MILLING MACHINES, 3 H.P. or 5 H.P.

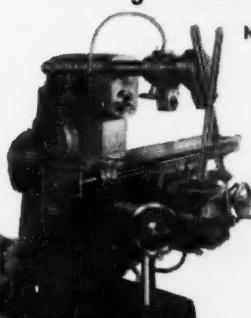


These verticals incorporate many of the time-saving features of the Universal and Plain Machines, as well as the versatile swiveling spindle head which permits milling surfaces or drilling holes at different angular positions without use of special fixtures.



Productioneered for high level output on long or short runs

NO. 2 PLAIN MILLING MACHINES, 3 H.P. or 5 H.P.



Designed for rapid, easy set-up and handling . . . built with more-than-adequate rigidity, these machines maintain their original accuracy through long, economical life. Efficient tri-motor drive, exclusive extended spindle face, time-saving controls.

Brown & Sharpe



**MARVEL BAND SAW saved these
two 4400 lb. castings**

Two sand cores washed out when these giant 4400 pound steel connecting rods were cast, resulting in solid eye ends without gaps. Then came the \$64 question—how to machine out the $1\frac{1}{2}$ " slots in the longitudinal center of the eyes which were 22" high and had a wall thickness of $6\frac{1}{2}$ ".

The Ernest J. Nelson Iron Works of San Francisco, did this "impossible" job easily, quickly and economically, without special tooling, on a standard Model No. 8M/2 MARVEL Band Saw. Two cuts were made in each rod in two hours per cut with tool cost of \$3.06 per rod. The tool was a MARVEL B9-10 Band Saw Blade.

Every tool room, machine shop and maintenance department needs a MARVEL Series 8 Universal Band Saw—not only for innumerable everyday jobs but for the occasional "trick" operations, where its utmost versatility will save many headaches and dollars.

WRITE FOR CATALOG



ARMSTRONG - BLUM MFG. CO.
5700 Bloomingdale Ave., Chicago 39, Illinois

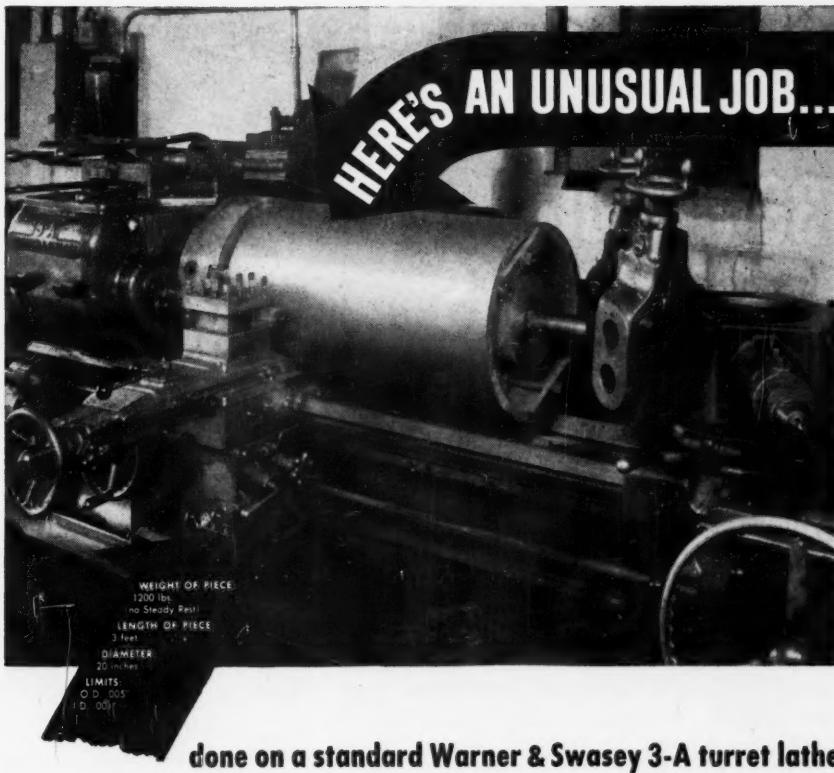
This is another of the
"HUNDREDS OF JOBS"
which can be done only on a
MARVEL Band Saw!



These exclusive MARVEL
features made this
job easy:

1. Large, T-slotted work table.
2. Blade feeds into work vertically; work always stationary.
3. Power-pressure feed.
4. Automatic blade tension.
5. Built-in coolant system.
6. Large capacity.





done on a standard Warner & Swasey 3-A turret lathe

THE HALEY MACHINE COMPANY of Springfield, Ohio, contracts to produce massive coal-crusher rolls.

These dense cast iron rolls weigh 1200 lbs. each. They are 36" long and 20" in diameter. The two hub bores, 6" and 9" long, must be finished to .001", and the O.D. to .005". All diameters must be held concentric within .005".

The roll was gripped internally and machined *with no steady rest* — held securely by the 3-jaw scroll chuck and two light tie rods. Two chuckings were needed, one for each end.

All limits were held, with an excellent finish obtained. The surprisingly fine results have assured Haley pro-

duction men that this job can be done profitably on a Warner & Swasey Turret Lathe.

The size and weight of this job, demanding smooth finish and unusually close limits, clearly shows the extreme rigidity and accuracy built into each Warner & Swasey Turret Lathe. Why not find out how this rigidity and accuracy can help you solve your turning problems? Call your nearest Warner & Swasey Field Representative or write . . .

**WARNER
&
SWASEY**
Cleveland

YOU CAN MACHINE IT BETTER, FASTER, FOR LESS WITH WARNER & SWASEY TURRET LATHES, AUTOMATICS AND TAPPING MACHINES

How to solve 39 PRODUCTION PROBLEMS with Mead Air Devices

Ready!

SEE how to use standard Mead units to make automatic or semi-automatic machines!

New 16-page Mead PHOTO - BOOKLET presents actual examples in pictures and text of 39 different, typical production problems solved by various combinations of Mead Air Operated Devices. Alert production men will readily adapt the ideas to their own needs. This interesting booklet shows how. Write today for booklet "Air Power at Work."

MEAD SPECIALTIES CO.

Dept. AA-112, 4114 N. Knox Ave.,

Chicago 41, Ill.



Write for
NEW
"BOOKLET 39"
Now!



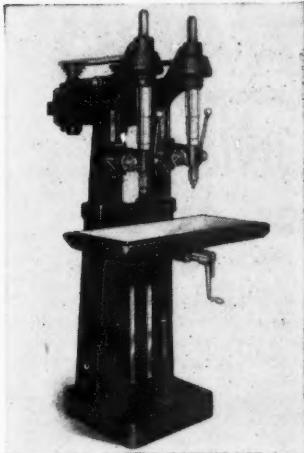
Tips on Better Drilling

RIGID CONSTRUCTION

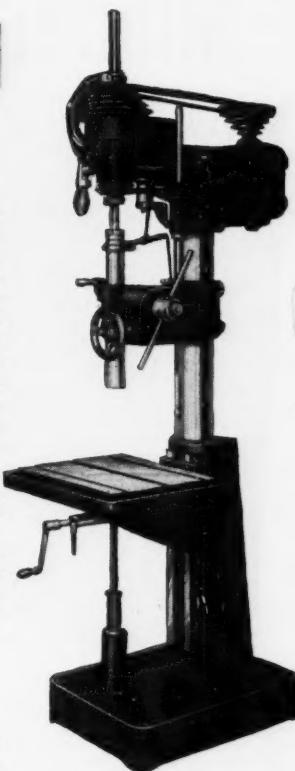
MEANS • Greater Accuracy
• Lower Drill Breakage

The less vibration transmitted through the spindle, the greater the accuracy in drilling, reaming and tapping. In the "Buffalo" No. 14 Drill, a machine designed to do extremely accurate work in the smaller range of drill sizes, the column, base and table are heavy and rigid. The spindle is alloy steel, running in ball bearings of a specially selected grade. The two ball bearings in the feed sleeve are mounted opposed and under constant spring load, preventing end play. The spindle pulley is mounted on a broached sleeve held in accurate alignment by two full-sealed ball bearings in such a way that belt pull is not transmitted to the spindle.

This and other precision construction features make "Buffalo" Drills lastingly accurate. WRITE FOR INFORMATION ON THE DRILL FOR ACCURATE RESULTS ON YOUR JOB.



"Buffalo" No. 14 High Speed Drilling Machine for manufacturing precision parts. $\frac{3}{8}$ " capacity. Write for Bulletin 2726-D.



"Buffalo" No. 22 Drill for heavy work up to 2" capacity in cast iron. Note rigid construction. Write for Bulletin 2989-F.

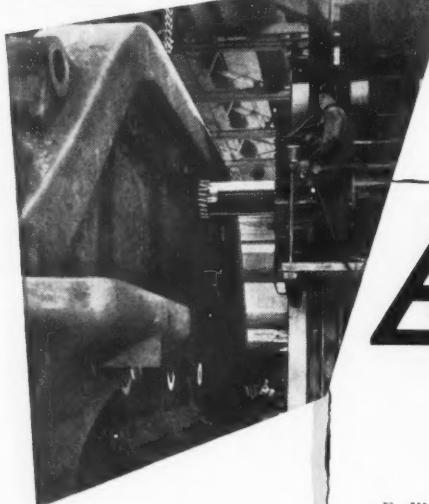
BUFFALO *Buffalo* FORGE COMPANY

388 Broadway

Canadian Blower & Forge Co., Ltd., Kitchener, Ont.

DRILLING PUNCHING CUTTING SHEARING BENDING

"Maximum Tool Life... Minimum Down Time... Year in and Year Out"



says
E.W.BLISS CO.
about

ADAMAS Carbide TOOL TIPS

E. W. Bliss, Toledo Division, secures 95% of its tungsten carbide tool tips from ADAMAS... with good reason! Engaged in machining large Meehanite castings, steel, steel forgings and bronze, Bliss finds it economical to fabricate and repair its own tools. Their experience has shown that using ADAMAS Carbide pays off—year in and year out, on all types of metals, machines, and jobs. Where BIG work is being done, ADAMAS Carbide is the dependable "work horse."

This five year performance record of consistent quality and good service is a typical ADAMAS user's experience. Specify ADAMAS—you will get steady daily production advantages and lick most of the difficult marginal jobs as well.

Send for the helpful group of "ADAMAS Aids to Carbide Users"

Photograph courtesy of E. W. Bliss Co.



PRODUCERS OF TUNGSTEN CARBIDE TOOL TIPS,
DIES AND WEAR PARTS

this is a bull nut

(as any refinery man knows)



and these are **APEX**
Bull Nut Drivers

(that save time and money in
many refineries)



Setting and removing bull nuts on preheaters of cracking unit furnaces used to be quite a task. It was, in fact, one of the most persistent and troublesome problems of refinery maintenance.

Not any more. This new series of Apex drivers solved that problem. They can be used with almost any make of power tool, and are available in a full range of lengths and hex sizes to accommodate all standard bull nuts.

They are considerably lighter than the tools formerly used for this type of work, yet they will provide longer service life. Can't tell yet how much longer—the first ones ever built are still in service!

Unless you operate an oil refinery, you probably aren't interested in Apex bull nut drivers. But if you have anything at all to do with nutsetting operations, you'll be very much interested in the many other types of Apex drivers.

Whatever your nutsetting problem, chances are you'll find the answer to it among the thousands of stock types and sizes of Apex

sockets, extensions, adapters and universal wrenches. And, if your problem should be very special, just send us a sketch or blueprint and we'll most likely come up with the special solution—just as we did for the oil refineries.

CATALOG 29 is packed with specifications, illustrations and helpful information on the complete Apex line—write, on your company letterhead please, for your copy.

APEX
TOOLS

sockets, extensions, adapters

THE APEX MACHINE & TOOL COMPANY
1027 S. Patterson Blvd., Dayton 2, Ohio

Power Bits, Insert Bits and Bit Holders, for Phillips, Frearson (Reed & Prince), Slotted, Clutch Head and Socket Head Screws • Hand Drivers for Phillips, Frearson and Clutch Head Screws • Two-Piece Drivers for Hex Head Screws • Sockets, Extensions, Adapters and Nut Setters • Universal Sockets, Extension Wrenches and Adapters • Aircraft and Industrial Universal Joints • Self-Releasing and Adjustable Stud Setters • Safety Friction Tapping Chucks • Vertical Float Tapping Chucks.

Time's Up...
for Time-Takers!



SAVE in finishing All Metals, Plastics, Wood, Glass, Hard Rubber,
Pressed and Laminated Materials and Combinations!



WHEELS, STICKS,
RODS, BLOCKS
in three textures
for machine and
manual operations

GENERAL USES—A FEW OF MANY:

Remove light digs, tool and heat marks. Clean welded and soldered joints. Finish dies and molds. Burr stampings, castings, machined parts. Maintain tools, equipment, machinery, parts.

TRY A TEST!

Ask your dealer for this sample card containing Brightboy blocks in 3 textures, and for the Brightboy Catalog-Manual. Write us if we cannot supply you—or on any problem where finishing is involved.



Add up your job time for step-by-step burring, cleaning, finishing, polishing. *How would you like to cut it in half?* Substantial savings, frequently as much as fifty per cent, can be achieved by rubber-cushioned Brightboy, which combines burring, finishing, cleaning, polishing into one operation!

In Brightboy you get the working advantages of both abrasive and rubber. The unique surfacing-action occurs as the rubber cushions the light grind of the abrasive the moment machine or manual finishing begins. Brightboy's work quality and versatility will give you a completely new concept of finishing. You can use it for many applications far beyond the scope of conventional abrasives.

HOW BRIGHTBOY SAVES PRODUCTION TIME

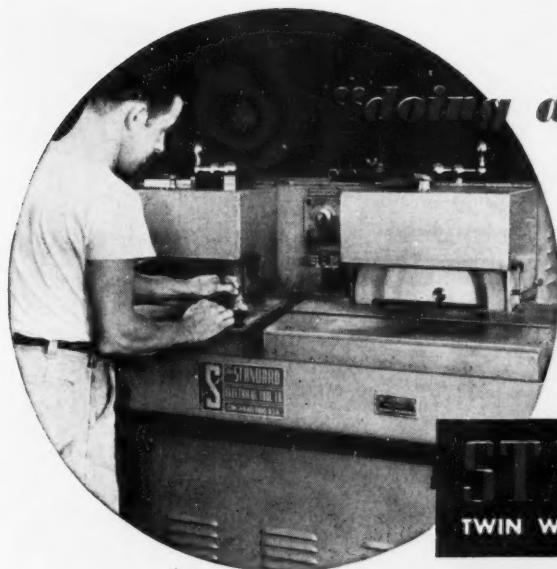
Use it for countless jobs regular abrasives cannot do—PLUS low cost, "every-day" finishing. Bridge the gap between the rough grind and the buff *in one operation!* Work to close tolerances. Shape to contour. Obtain a wide variety of conventional and special finishes and patterns—damaskeening, for example; often the "final" polish. No before-use preparation or dressing needed. No skilled labor necessary.



BRIGHTBOY INDUSTRIAL DIVISION
WELDON ROBERTS RUBBER CO.

6th Ave. & No. 13th Street Newark 7, N. J.

America's Pioneer Manufacturer of
Rubber-Bonded Abrasives



"...doing a job"

at

*Avey**

STANDARD TWIN WHEEL TOOL GRINDERS

* Here's what the plant manager at Avey Drilling Machine Co., Cincinnati, has to say about Standard's Twin Wheel Tool Grinder:

"Any grinder that stands the punishment that we give it here at Avey must be a good grinder. All day long, day after day, we grind Carbide tipped lathe tools including boring, cut-off forming, and other high-speed steel tools. Maintenance has been only routine. Down time . . . none. Its economy is amazing."

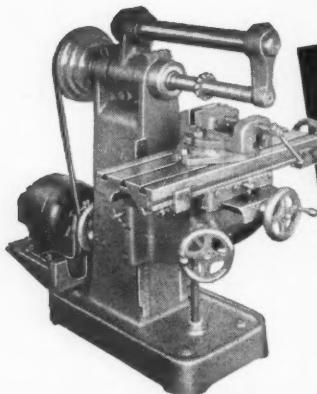
Why not install a Standard Twin Wheel grinder in your plant? Available in 10" and 14" wheel sizes, wet or dry. No spray or splash when wet grinding. Two operators can grind at once. Conserves floor space. Write for Bulletin TW.

standardize with . . .
the STANDARD electrical
2487 RIVER RD. • CINCINNATI 4 • OHIO

Avey reports these results:

- increased production
- 30% decreased grinding time
- grinding costs way down
- less operator fatigue
- much longer wheel life

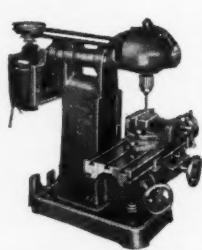
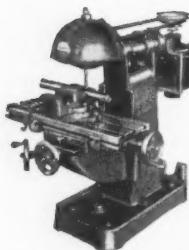




BENCHMASTER
pays off 5 ways!

Where else can you find a low cost tool
with so many cost-cutting possibilities?

1 FOR HORIZONTAL MILLING quill and overarm slip quickly and snugly in place. Timken Tapered Roller Bearings provide a rigid spindle support at high speeds as well as low. No. 2 Morse Taper. 12½" horizontal table travel with a big 6" x 18" table area.



2 WANT A VERTICAL MILLER?

The same machine is quickly converted by substituting this special head. Again Timken Tapered Roller Bearings give smooth, chatter-free performance over a wide speed range. Accessories available: Full line of Benchmaster collets and drawbar; swivel-base vise.

- ★ For Precision
- ★ For Quality
- ★ For Value

You can't beat a
BENCHMASTER!

3 WHEN IS A MILL NOT A MILL?

Here's a handy kink to obtain extra lathe facilities for facing, turning, forming, etc. Benchmaster Accessories required: Tapered Adapter and Tool Block. By lowering knee position and raising tool you can swing up to 23". Exceptional capacity!

4 QUICK CHANGE ARTIST

Here's the Benchmaster converted to a grinder! Free-rolling bearings maintain high spindle speeds without overheating or risking bearing injury. Grinds internally, surfaces, sharpens cutters, etc. Note Benchmaster 6" Rotary Table—a fine accessory.

5 AND NOW IT'S A DRILL PRESS

The No. 2 Morse Taper in spindle accepts standard Jacobs Chuck Shank. Raising table feeds work into drill. With this setup, drilling layouts is easy—simply measure off correct hole spacing with the lead screws.

NOTE: BENCHMASTERS are also available with rack and pinion feed. For production work this provides exceptionally fast operation.

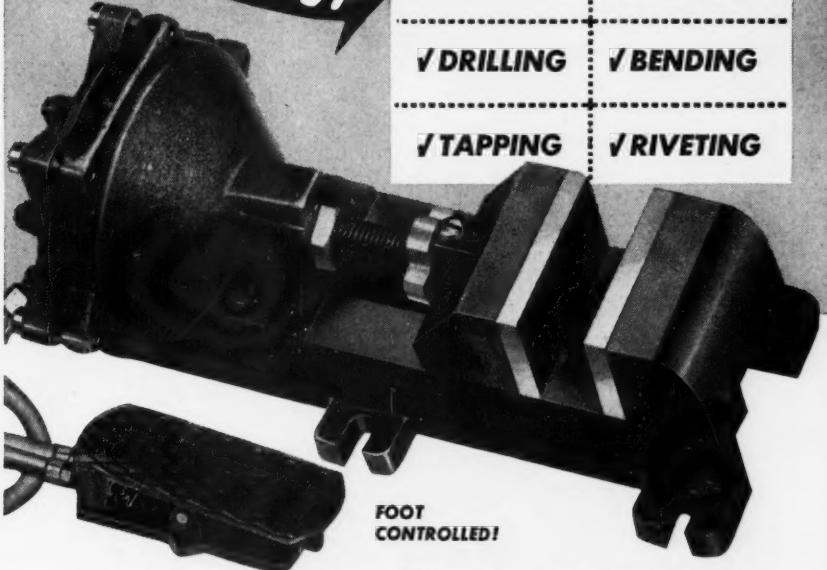
BENCHMASTERS are accurately built with all the care and precision of larger, more expensive tools . . . yet may be purchased for a fraction of big machine cost! Get our circulars on all BENCHMASTER EQUIPMENT!

benchmaster
MANUFACTURING COMPANY

1835 W. ROSECRANS AVENUE,
GARDENA, CALIFORNIA

SPEEDY AIR VISE

SPEEDS UP



**FOOT
CONTROLLED!**

GRIPPING FORCE 15 TIMES AIR LINE PRESSURE

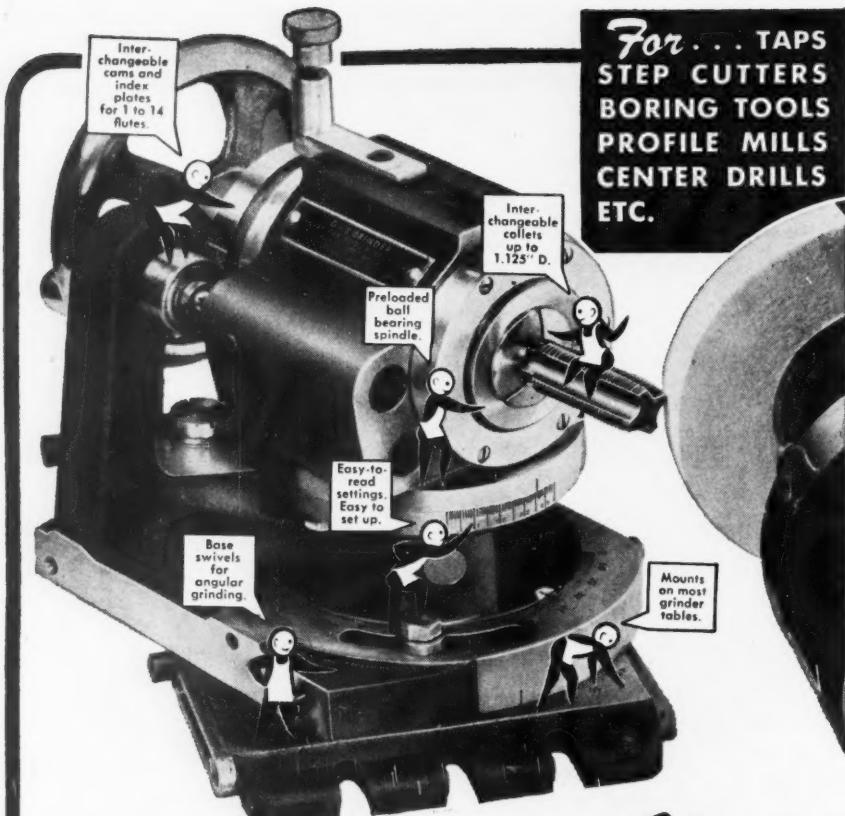
Speedy Air Vise helps you do dozens of operations faster, better, cheaper—by air pressure! Foot control valve opens and shuts vise instantly, leaving both hands free to produce more! Jaw opens up to 3 inches, holds castings, parts, jigs, etc. Compact, trouble-free, inexpensive.

Complete with Foot Control Valve, Air Hose and Fittings . . . only **\$29.90**

ORDER FROM YOUR MILL SUPPLY DEALER OR WRITE DIRECT

 AIR REGULATOR Precision-built. Delivers pressures up to 140 lbs. With gauge, \$4.95 Less gauge, \$2.75	 AIR FILTER Keeps water and particles out of the regulator and pneumatic tools. \$2.15	 BLOW-GUN Looks and operates like a gun. Ideal for cleaning and blowing out chips, dust, filings, scraps, etc. . . . \$3.00
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W. R. BROWN CORP. • 2649 N. NORMANDY AVE. • CHICAGO 35, ILL.



*For . . . TAPS
STEP CUTTERS
BORING TOOLS
PROFILE MILLS
CENTER DRILLS
ETC.*

What a relief!

More Cuts Per Grind Better — Freer Cutting

Reduce perishable tool costs with this preferred grind on your straight and spiral flute production cutters — Easy and fast as ordinary angular relief grinding.

D-S GRINDER DIVISION
ROYAL OAK TOOL & MACHINE CO.
621 E. Fourth St., Royal Oak, Mich.

D-S
RADIAL
RELIEF
GRINDER

DANLY SPECIAL DIE SETS



Danly all steel 4-post special die set, 14" x 44".



Completed die for blanking a Nash door component—built for longer die life in a Danly all steel 4-post special die set.

help Nash meet close production schedules!

Dies play a big part in modern high-speed automobile production. They have to be ready on time when model changes are scheduled and they have to stand up under three-shift operation day in and day out with a minimum of down time. That's why you'll find so many Nash production dies built in Danly Special Die Sets. A Danly set means fast delivery to meet the tooling schedule and a rugged, precise base for the dies that assures maximum die life.

DANLY MACHINE SPECIALTIES, INC.
2100 South Laramie Avenue • Chicago 50, Illinois

DANLY SPECIAL DIE SET
SERVICE IS FAST AND CONVENIENT
—CALL YOUR NEAREST DANLY BRANCH

- ***CHICAGO** 50 2100 South Laramie Avenue
- ***CLEVELAND** 14 1550 East 33rd Street
- ***DAYTON** 7 3196 Delphos Avenue
- ***DETROIT** 16 1549 Temple Avenue
- ***GRAND RAPIDS** 113 Michigan Street N.W.
- ***INDIANAPOLIS** 4 5 West 10th Street
- ***LONG ISLAND CITY** 1 47-28 37th Street
- ***LOS ANGELES** 54 Ducommun Metals & Supply Co., 4890 South Alameda
- MILWAUKEE 2 111 East Wisconsin Avenue
- ***PHILADELPHIA** 40 511 W. Courtland Street
- ***ROCHESTER** 6 33 Rutter Street

*Indicates complete stock

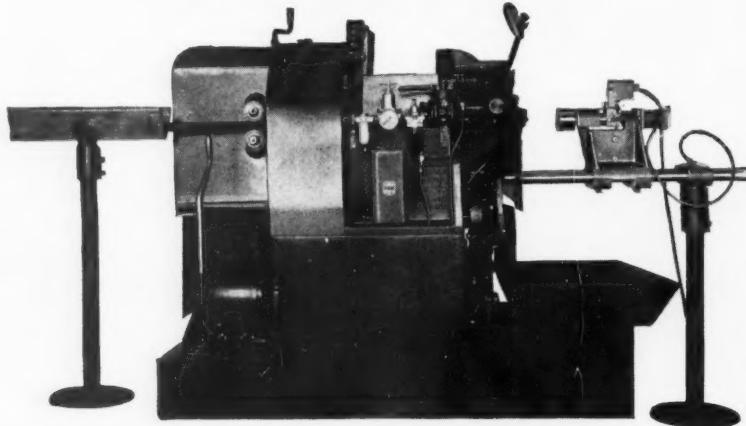


View of die shown above mounted in 150-ton press at the Seaman Body Plant of the Nash-Kelvinator Corporation in Milwaukee, Wisconsin.



DIE SETS . . . STANDARD OR SPECIAL
DIEMAKERS' SUPPLIES

The NEW MODERN AUTOMATIC CUTTING-OFF MACHINE



Cuts Off Tubing, Pipe and Shafting . . . FAST

Cuts off longer pieces than a regular automatic machine. In fact, cuts off any length you want—and cuts it faster. If your production requires quantity cutting-off of tubing, pipe or shafting, check the figures below against your present time.

1/2" Tubing

This machine cuts off and chamfers both outside edges of $\frac{1}{2}$ " .030 wall tubing, 5" long, at the rate of one every 2.5 seconds.

1 1/4" Cold Rolled

This machine cuts off and chamfers both ends of $1\frac{1}{4}$ " cold rolled, 20" long, at the rate of one every 20 seconds.

1" Tubing

This machine cuts off and chamfers both outside edges of 3" long, at the rate of one every 3 seconds.

These popular, time saving machines are now available in four sizes, handling work up to $6\frac{3}{4}$ " O.D. Their many cost cutting features are described and illustrated in our latest catalog that will be mailed promptly on request.

4" Threaded Studs



Cut and chamfered at one time—in 8 seconds—from 10 ft. length of stock already threaded. ($\frac{3}{8}$ " U. S. Standard.) Clean cut. Clean chamfer. Nuts start easily, with no extra finishing required.

WRITE FOR ILLUSTRATED CATALOG.

MODERN MACHINE TOOL CO.
Jackson, Michigan

you can even feel them make time

You can tell by the quiet smooth operation of these C-O Cincinnati 16"-3000 drills that they're really built for accurate work, long hours, and consistently high earnings. High production . . . freedom from vibration and chatter . . . plus the "feel" of a fine tool are the end result of the extra features that make these drills "of outstanding value." And remember, this is just one of many machines available in the complete C-O Cincinnati line to meet all your drilling requirements.

Accurate, alloy steel spindle, mounted in a ground steel quill between permanently sealed high-grade ball bearings. Capacities up to 1" in cast iron.

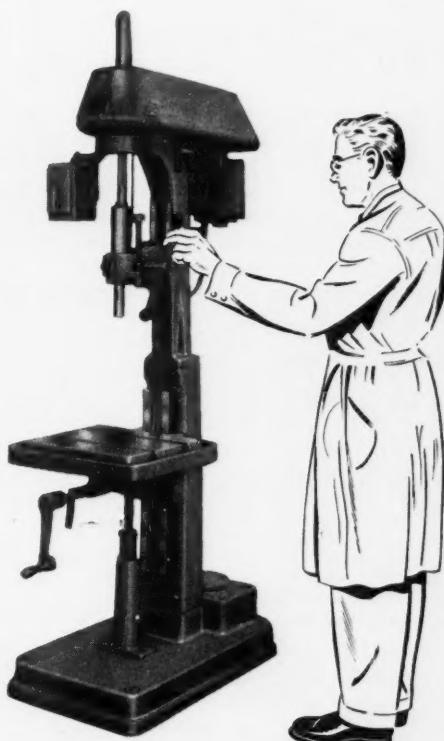
Full floating drive transfers all belt pull to two additional ball bearings in the spindle pulley.

Hand-scraped head ways cast integrally with the frame provide rigid support for the head. (Counterweight concealed in frame.)

Tilting motor bracket permits easy belt shifting for speed changes without wrenches; helps maintain proper belt tension.

Positive, speedy spindle return is adjustable to changing job requirements.

Write for Catalog D-108 and the name of your dealer.



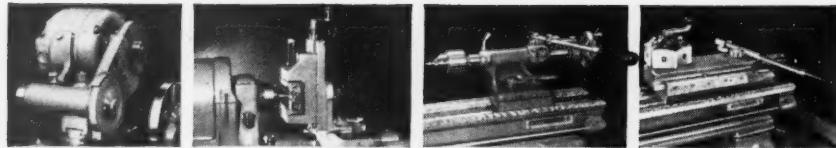
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CINCINNATI 9, OHIO, U.S.A.

cincinnati lathe & tool co.

November, 1952

MODERN MACHINE SHOP 39

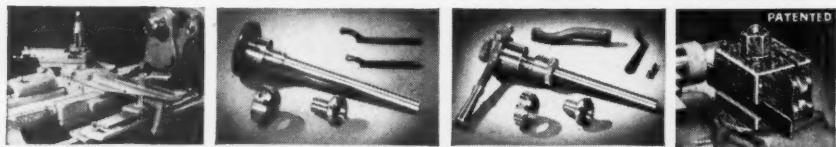


External Grinder

Milling Attachment

Handlever Tailstock

Handlever Bed Turret

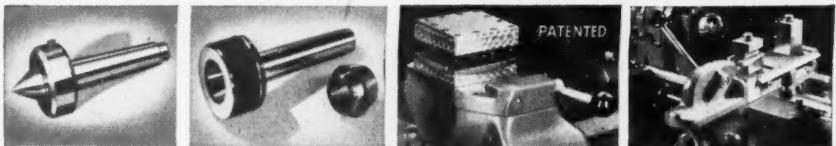


Telescopic Taper Attachment

Handwheel Collet Attachment

Handlever Collet Attachment

10 in 1 Tool Holder

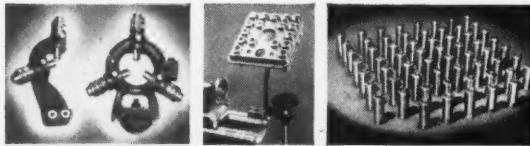


Ball Bearing Live Center

Adjustable Collet Bushing Chuck

Square Turret Tool Block

Handlever Double Tool Cross Slide

Telescoping Jaw Follower Rest
and Center Rest

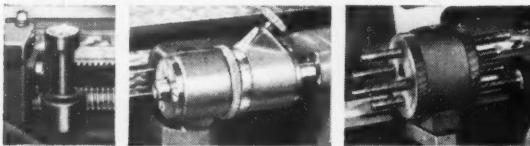
Collet Rack

Steel and Brass Collets



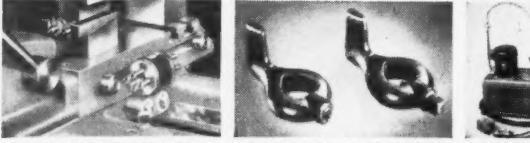
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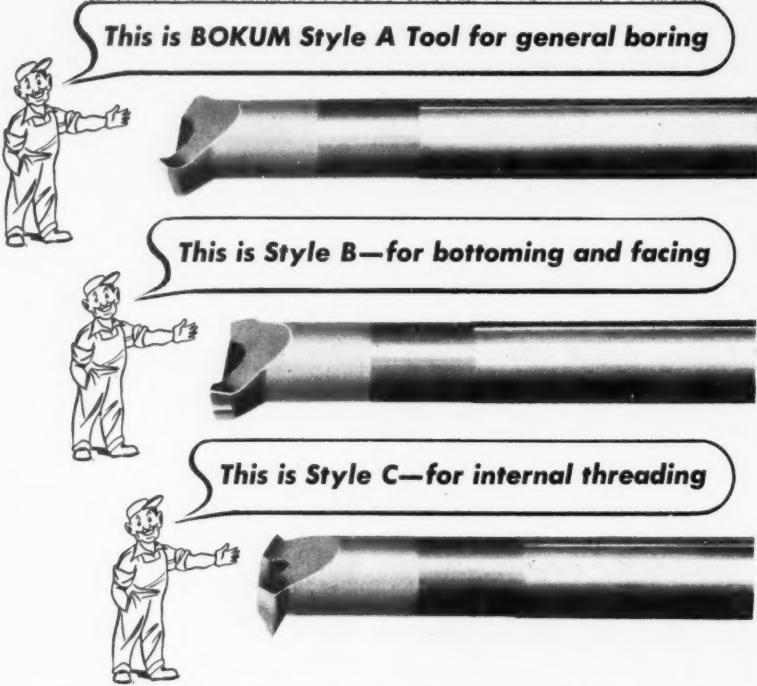
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For jobs where neither the capacity nor expense of a heavy industrial machine is warranted, and where a "hobby machine" would be wholly inadequate, Walker-Turner has engineered a special class of *light-heavyweight* Band Saws.

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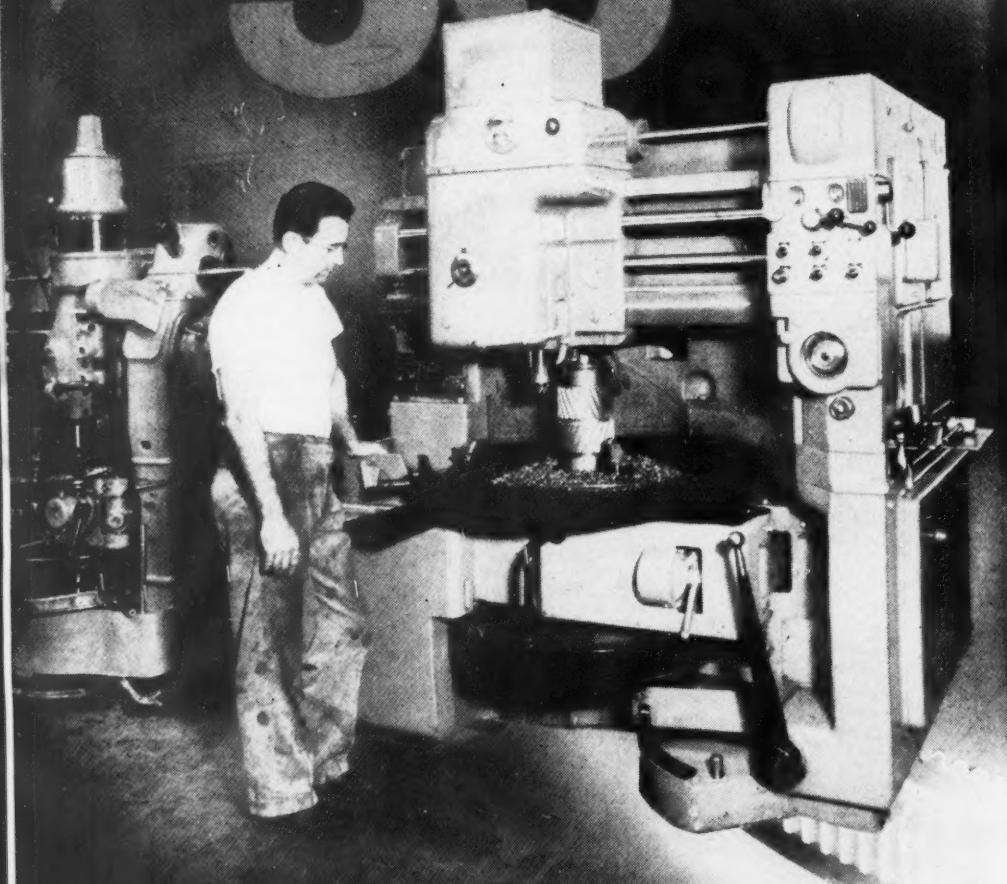
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the 36

A Gear



Shaper for



**HEAVY DUTY
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as well as those

**UP-TO-36"
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May we emphasize, once again, that the 36-Type Gear Shaper cuts small gears fast, too. More machines are bought for roughing and finishing 8, 10, 12 and 14 inch gears than for the sizes closer to its maximum limit of 36" pitch diameter.

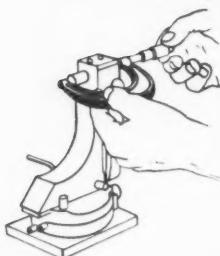
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Wire, write or phone the Fellows Office nearest you whenever you have need to discuss ways of reducing costs on gear tooth machining operations.

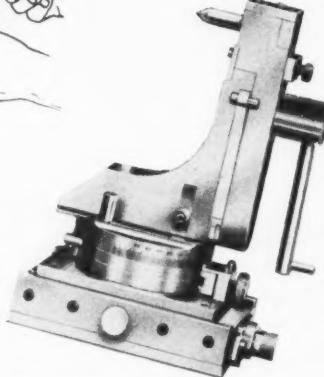
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THE FELLOWS GEAR SHAPER COMPANY • Head Office and Export Department: 78 River Street, Springfield, Vermont, U.S.A.
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eliminate elaborate set-ups
and operations



Step 1. Obtain micrometer reading as shown, and add required convex radius or subtract required concave radius.



ADAPTABLE TO ALL TYPES OF CYLINDRICAL AND SURFACE GRINDERS

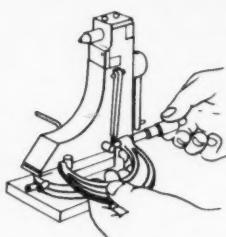
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J & S TOOL CO., INC.
475 Main Street, East Orange, N. J.

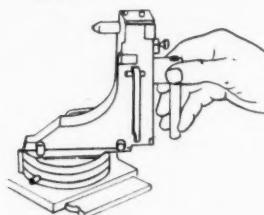
.0001" ACCURACY
Fluidmotion
WHEEL DRESSERS

dress two angles tangent to a radius
in one continuous motion

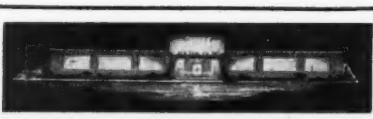
High-Carbon, High-Chrome Construction



Step 2. Next loosen gib with wrench and "mike" over lower pins to reading obtained in Step 1.



Step 3. Tighten gib; set stops for two angles; ready for action.



New home of J & S Tool Co., Inc.

**J & S
TOOL CO. INC.**

A variety of models and attachments to suit your needs. Write for free catalog covering dressers in detail. J & S also manufactures a complete line of All-Purpose Jaw Machine Clamps, Vises, and Special Tools. Write for Machine Shop "Time Savers" booklet.

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Model J, 10" x 18"
capacity. Available
as a wet or dry
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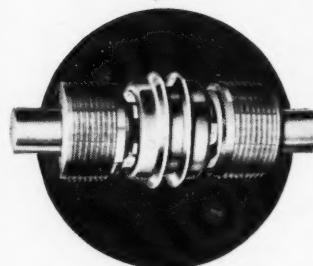
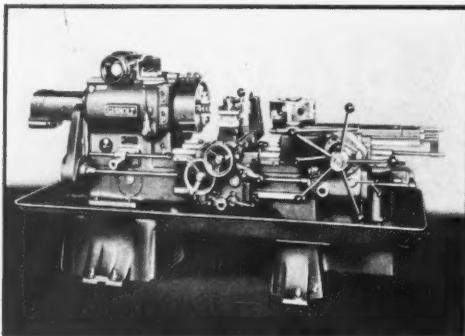
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ROCKFORD CLUTCHES

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Specifications,
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design and
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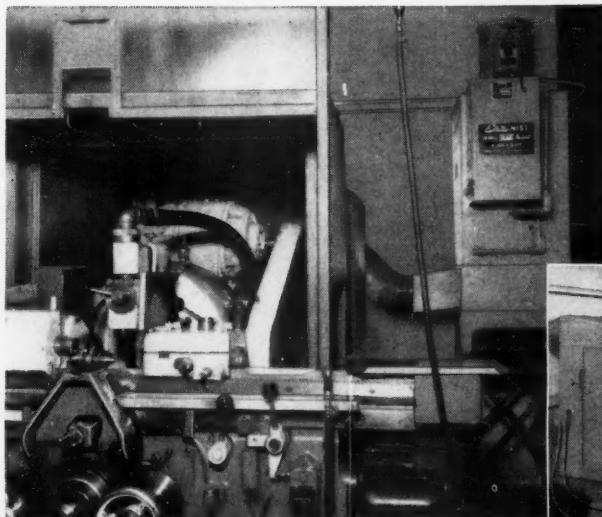
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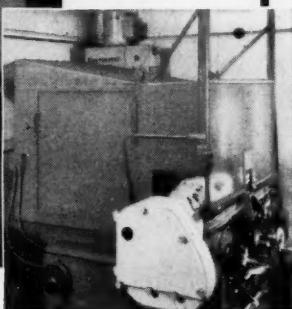
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TOOL & CUTTER GRINDERS—DRILL
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If you are interested in safer, cleaner *high speed* grinding and cutting operations call your AAF representative today or write for complete details on Electro-Mist contained in AAF Engineering Bulletin No. 251.



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COMPANY, INC.

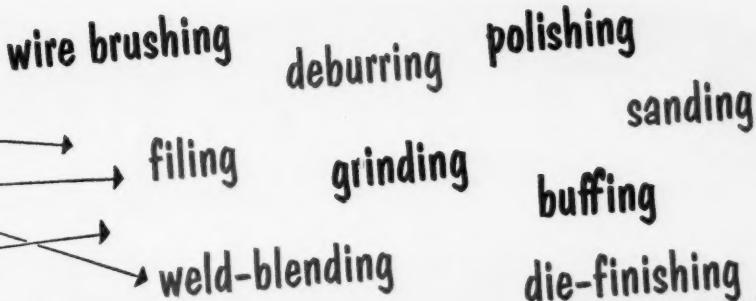
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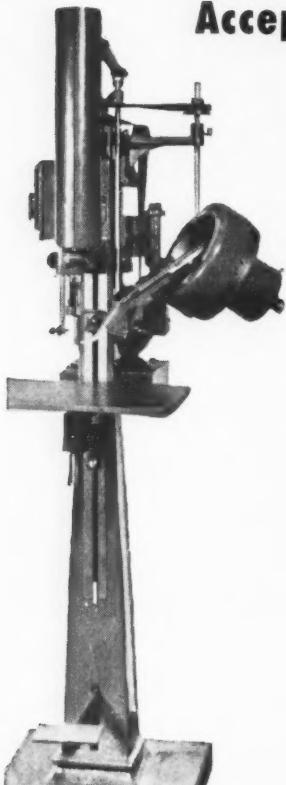
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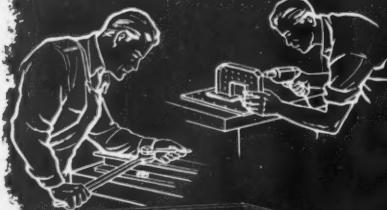


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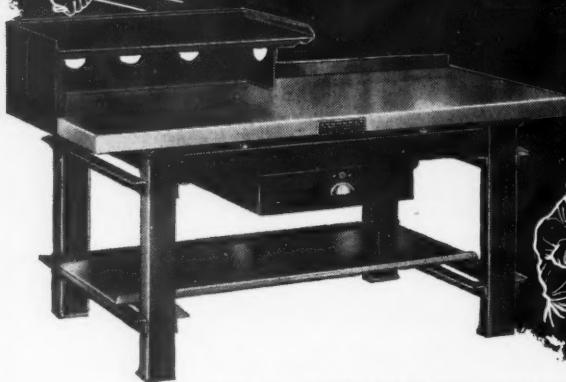
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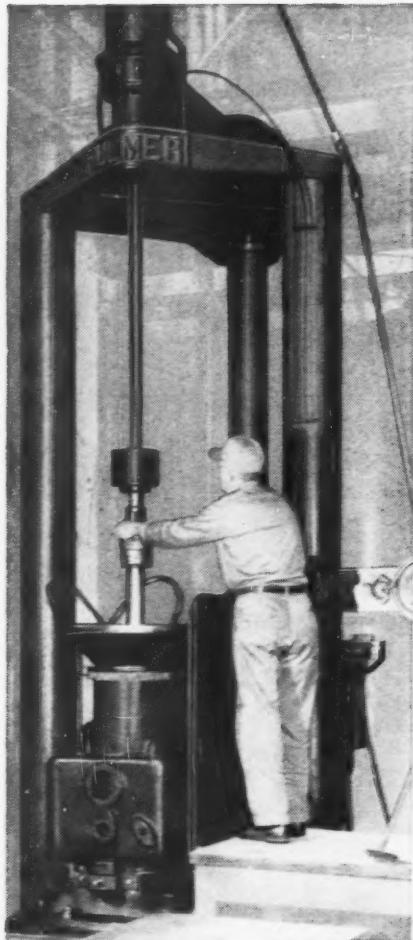


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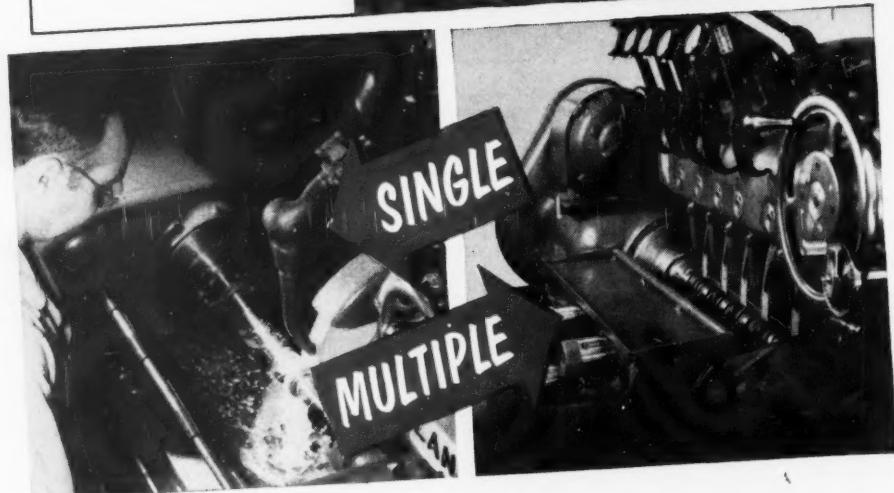
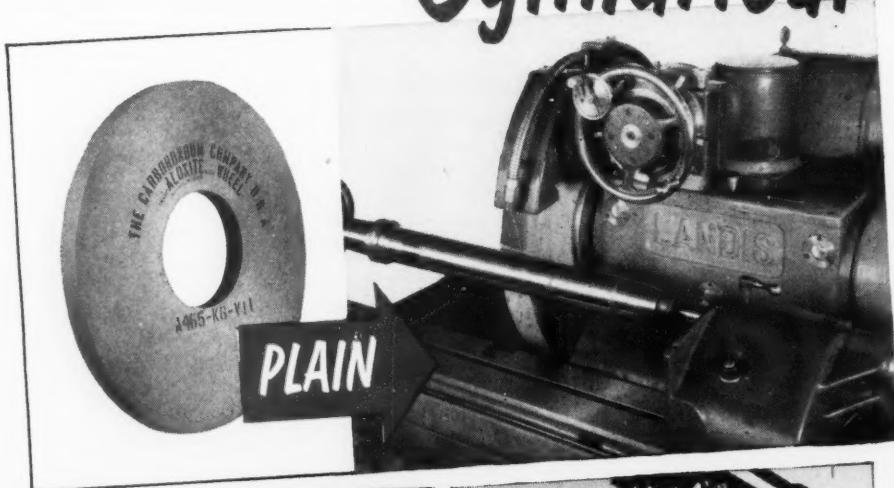
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A recent survey of over 131,626 A-C motors shows the use of "Cartridge" Pre-lubricated bearings saved a yearly average cost of \$270.00 per hundred motors by eliminating periodic relubrication.

In addition to this \$270.00 saving, motors using "Cartridge" bearings showed an indicated saving of \$480.00 by reducing motor outage, lost machine time and man-hours.

A total yearly saving of \$750.00 per hundred motors! You, as a manufacturer of motors, machine tools, pumps or other machinery can pass these savings to your customers by using Norma-Hoffmann "Cartridge" Ball Bearings. How — because these patented bearings require no periodic relubrication.

Made to double-row width, Norma-Hoffmann "Cartridge" single-row ball bearings have 100% more grease capacity than conventional width sealed bearings. The highly efficient seals keep dirt out, grease in. Factory-packed with Norma-Hoffmann's specially compounded "stability-tested" grease . . . grease that is highly resistant to oxidation and breakdown . . . assures dependable operation for long periods without regreasing.

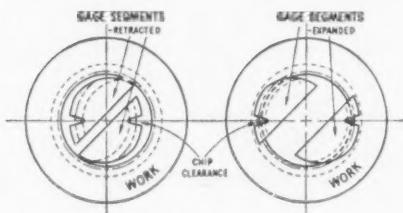
Use Norma-Hoffmann "Cartridge" Ball Bearings in your products. Our engineers are always available for consultation on your bearing applications. Write for their services.

NORMA-HOFFMANN
Precision **BEARINGS**

BALL • ROLLER • THRUST

NORMA-HOFFMANN BEARINGS CORPORATION-STAMFORD, CONN.
FIELD OFFICES: Atlanta, Birmingham, Charlotte, Chicago,
Cincinnati, Cleveland, Dallas, Detroit, Jacksonville, Kansas City,
Los Angeles, San Francisco, Seattle

The new Bryant Internal Thread Gage will check parts 4 to 5 times faster!



Plug segments are collapsed so gage may be inserted or withdrawn without threading.

Plug segments are expanded to give full length contact on all the threads.

The new Bryant internal thread gage is based on the principle of a split plug gage. The plug segments are collapsed by a thumb lever and inserted into the threaded hole. When the thumb lever is released, the plug segments expand to contact the internal threads in the parts being inspected.

This new gage is portable, therefore, threads may be checked while the part is chucked in a machine, and it offers extra convenience when inspecting threads in large, heavy casting that cannot be moved conveniently.

The Bryant gage is designed to give one accumulated reading of P. D., form and lead on the dial indicator. For the first time it is now possible to sort parts into

known classifications for fit (assemble-ability). This gage is used for the inspection of internal threads in a range from $5/16''$ to $1''$ diameter. Interchangeable segments are easily attached to the gage to cover a wide range of thread sizes. These segments are made to the same tolerances in P. D., lead, and form as a Class "W" Master. The life of the segments is lengthened by the fact that the gage does not have to be screwed into or out of the threaded hole — a partial turn gives a full reading on all the elements of all the threads.

Actual tests show that the Bryant portable internal thread gage will check parts four to five times faster than the standard plug gage!

MAIL THE COUPON FOR
FURTHER INFORMATION

COUPON

Please send me complete details on
the New Bryant Portable Thread Gage.

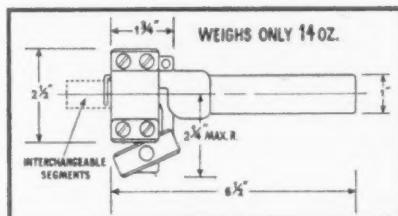
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COMPANY _____

STREET _____

CITY _____ STATE _____



B R Y A N T
CHUCKING GRINDER CO.
SPRINGFIELD, VERMONT, U.S.A.

COMFORT "FLIES HIGH"

BORING TIME "NOSE-DIVES"

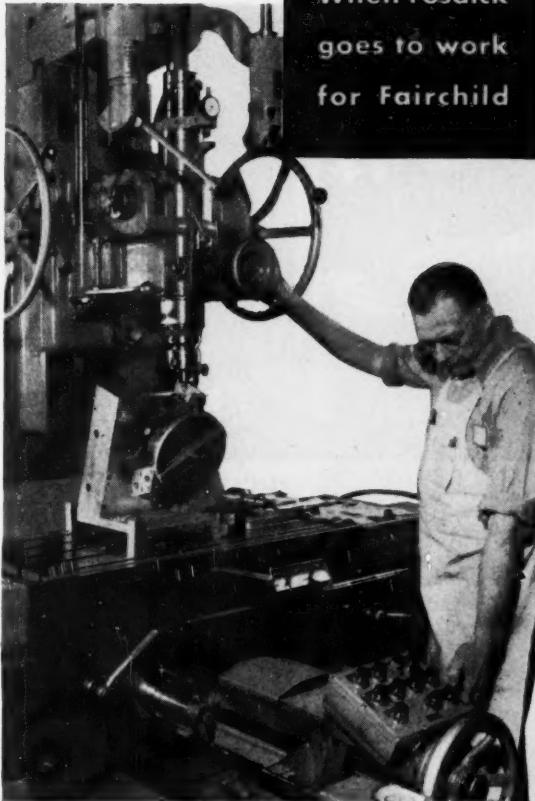
■ Trans-Atlantic airline passengers fly in safety high above North Atlantic storms . . . breathe in "living-room" comfort at 25,000 feet — thanks to the cabin pressurizer made by Fairchild Engine and Airplane Corporation. Mass production of the precision magnesium housing unit for commercial and military cabin superchargers demanded speed and unerring accuracy. That's why Fairchild installed Fosdick Automatic Positioning Machines for drilling, facing and boring $31/32$ " holes to a depth of $1.670"$. Result? Accuracy to $\pm .0001"$. . . boring time slashed 40% over previous methods.

"And equally important," says Assistant Plant Manager C. E. Luhman of Fairchild's Stratos Division, "is the phenomenal flexibility of the Fosdick Automatic Positioning Machine. It's simple to interrupt production — run through 5 or 6 pieces for an experimental unit — and then return to production with an absolute minimum of down time."

If, like Fairchild, you need exact reproduction of drilled, bored and tapped parts — plus quick changeover from one job to another — with holes located to tolerances as close as $\pm .0001"$ — investigate the Fosdick Automatic Positioning Machine today. It will actually pay for itself many times over through savings in man hours, set-up time, materials and jig storage space. Call your Fosdick Distributor today or write for Bulletin APMMS.



When Fosdick
goes to work
for Fairchild



FOSDICK

Fairchild's Stratos Division slashed boring time 40% with this Fosdick Automatic Positioning Machine. A touch of the button positions the work electrically for each new hole to $\pm .0001"$ center line tolerance — in seconds! Costly jigs have been replaced by two $3/8$ " square duplicating bars drilled quickly for the job and stored easily.

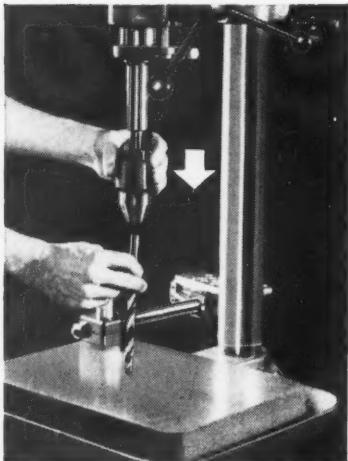
RADIAL DRILLS
SENSITIVE AND UPRIGHT DRILLS

THE FOSDICK MACHINE TOOL CO., CINCINNATI 23, OHIO

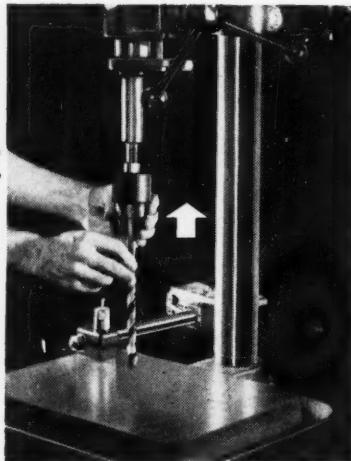
JIG BORERS
AUTOMATIC POSITIONING MACHINES
SENSITIVE RADIAL DRILLS

Change tools *in seconds* with this FULLY-AUTOMATIC CHUCK

no keys . . . collets . . . or wrenches



SPINDLE
NEVER
STOPS



HERE'S ALL THERE IS TO CHANGING TOOLS

TO OPEN—Grip Sleeve—pull down—jaws open automatically—tool is released.

TO CLOSE—Insert new tool—push up tapered part—tool is locked in place.

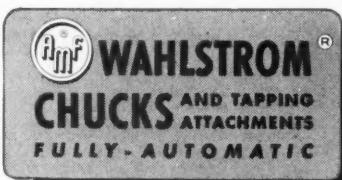
SAVE TIME—Change tools with spindle running . . . no keys, collets or wrenches needed. Ideal for fast, uninterrupted production.

SAVE MONEY—One spindle does the work of several. Smooth, hardened, ground jaws grip tight without chewing tools. Grip increases with load.

IDEAL FOR—Precision drilling or for spotting, drilling and reaming in boring or milling machines; in lathe work for burring, turning and filing.

Available in two capacity ranges,
1/64" to 3/8" and 1/32" to 1/2".

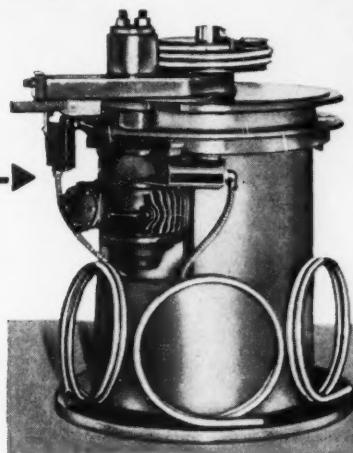
Order from your local industrial supply distributor or write for illustrated folder to:
Wahlstrom/Float-Lock Sales Dept., American Machine & Foundry Co., 511 Fifth Ave., New York 17, N.Y.



BENDING FULL CIRCLES

on a Pedrick Production Bender

The Pedrick Production Benders are very suitable for bending full circles. The machine shown makes a coil of bends; the coil is then cut through with an abrasive wheel and as many full circles result as are wrapped in the coil. This bending process permits a minimum cut-off waste of material as well as reduces the number of cutting operations. The same machine can be used for conventional bending of pipe, tubes, reinforcing bars, etc.



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PEDRICK TOOL & MACHINE CO.

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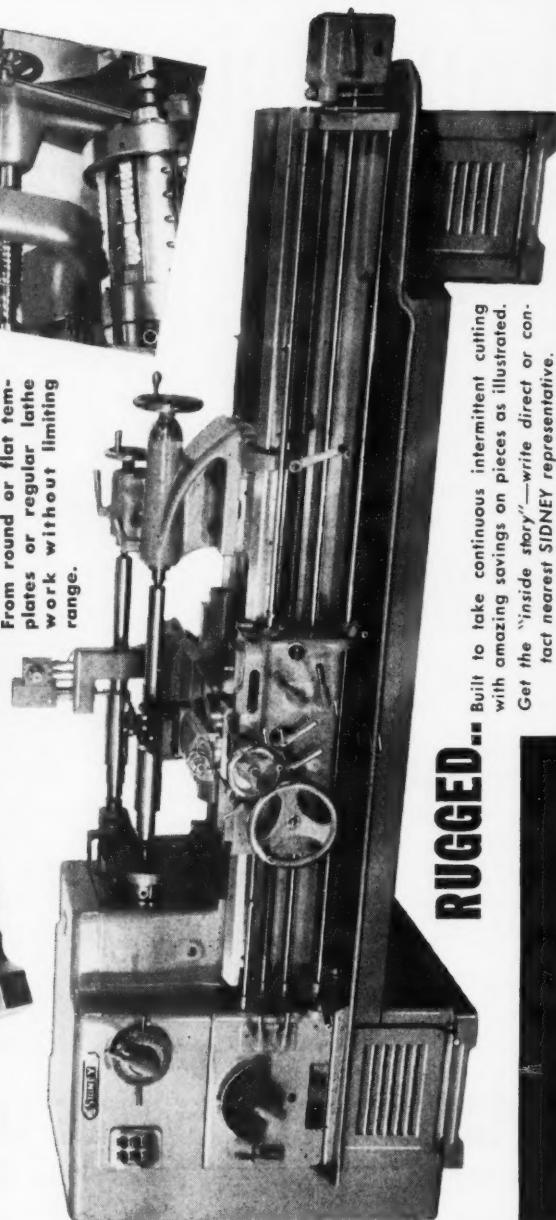
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IN PRODUCTION	TIME—COSTS
1 HOUR AND	55 MINUTES
55 MINUTES	PER PIECE

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TRACER TIME
ONLY 10 MINUTES**

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plates or regular lathe
work without limiting
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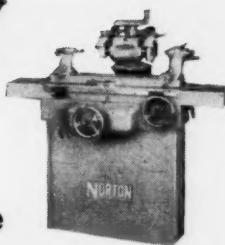
**SIDNEY HEAVY-DUTY
LATHES**

SIDNEY MACHINE TOOL COMPANY • SIDNEY, OHIO

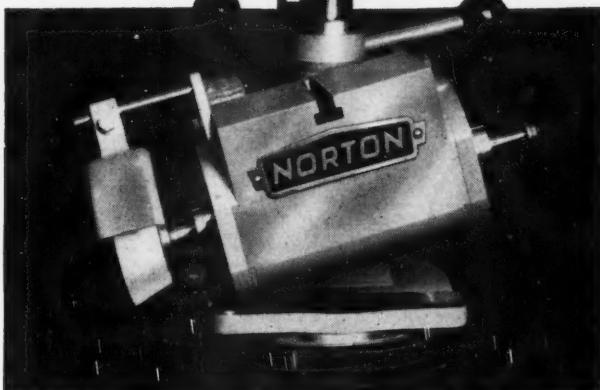
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The wheel head tilts!

on the



'20 cutter and tool
grinder



That's why
no other cutter
and tool
grinder
does so many
jobs so fast
...so easily!

FOR GREATLY INCREASED VERSATILITY
the wheel head of the Norton No. 20 Cutter and Tool Grinder can be tilted up to 15° above or below horizontal, and swivelled through 360°. This simplifies such difficult jobs as grinding taper reamers, step counterbores, form tools and milling cutters.

Other advantages include: greater lengths of table traverse and wheel slide travel . . . integral motor spindle . . . centrally located column elevating hand wheel . . . wheel slide graduated dials readable from any position . . . automatically lubricated table ways . . . electric equipment built to Machine Tool Builders' standards . . . wheel spindle reversing switch (optional) for carbide grinding.

Remember — Norton offers you the longest experience in both grinding machines and wheels to help you produce more at lower cost.

Investigate how the No. 20 can modernize and speed up your tool and cutter grinding. See your Norton Representative for details—and ask him about Norton Cutter and Tool Grinders Nos. 1 and 2, and the Bura-way Grinder for automatic lathe tools. Meanwhile, write direct for Catalog 189. NORTON COMPANY, Machine Division, Worcester 6, Massachusetts.

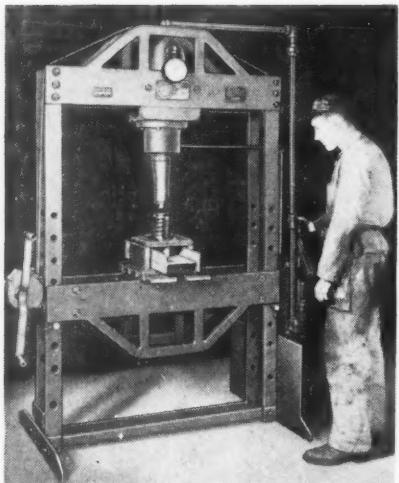
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KRW HYDRAULIC PRESS DOES 4 VITAL JOBS ON POLE-SETTING DERRICKS

BATAVIA METAL CORP. bought a K. R. Wilson 75 ton motor-driven Hydraulic Press two years ago to perform a few routine operations on their pole-setting derricks (derrick shown on telephone truck below). But they soon found that the amazing versatility of the press—the ease and speed with which it can be converted from one set-up to another, makes it a natural for all kinds of trouble shooting. Below are just a few of the jobs their KRW press does.

1. SETTING RIVETS in side legs and front braces of pole-setting derricks. Thanks to their KRW press, Batavia Metal has eliminated loosening of rivets and the resulting loss of valuable production time.



3. FORMING BRACKET U'S for derrick mountings on front of trucks and riveting the lower sections of front mountings are two more jobs done quickly, accurately and efficiently on the KRW Hydraulic Press.



2. COSTS CUT 33 1/3 % The center hole on derrick foot plates must be $1\frac{1}{2}$ " in diameter, flanked by two $\frac{1}{4}$ " holes. Originally the company drilled three $\frac{13}{16}$ " holes on a small drill press, then moved the plates to the machine shop where the center eye-bolt hole was reamed out to $1\frac{1}{2}$ " diameter. Use of a single die plus the KRW press produces all three holes in one stroke and eliminates the drilling and reaming operations, cutting costs by more than $\frac{1}{3}$.



4. FORMING BASES for ratchet jacks and restoring proper contour to various castings which sometimes warp as they cool are also regular assignments for this KRW press. Company officials tell us that their KRW Hydraulic press is in use the greater part of every working day!

Any pressing problems in your plant? Check with K. R. Wilson for the right press to do the job. KRW Hydraulic Presses come in one, two and three cylinder models; 25 to 150 ton capacities; hand operated, air operated or motor driven. For facts and prices contact your machinery dealer or write, wire or phone Dep't. 16.

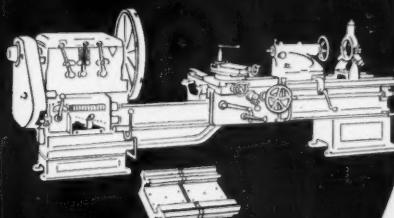
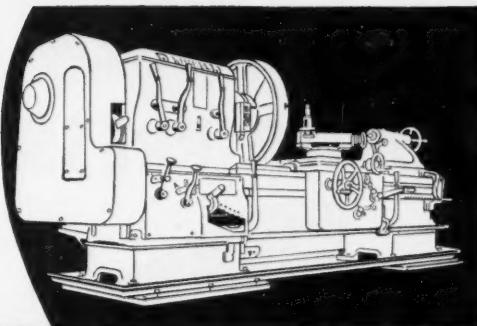
IMMEDIATE DELIVERY on type of press shown above up to 75 ton capacity, hand, air or motor driven.

K. R. WILSON

215 MAIN STREET BUFFALO 3, N. Y.

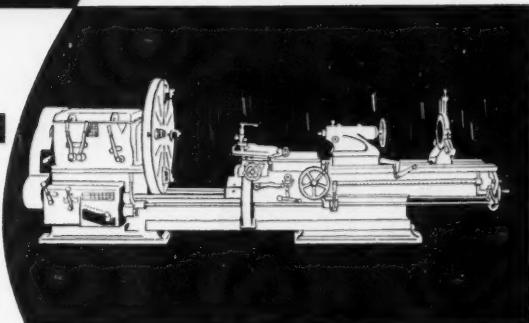
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They're basic, economical,
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from 18" to 50". Send for
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Now! A NEW CONCEPT IN POWER PRESS OPERATION



Pictured is Famco's 18-ton open-back, inclinable power press featuring the exclusive Electromatic clutch.

SOLENOID
OPERATED
CLUTCH

famco *Electromatic* 18-TON POWER PRESS

Famco now offers the most fool-proof, small power press clutch ever designed—the solenoid operated, nine-point jaw clutch. The handy selector switch provides ready changeability from non-repeat single stroke to continuous operation—from on to off positions—plus, a neutral position which locks the clutch, making hand or foot controls inoperative.

The Electromatic 18-ton Power Press gives the greatest versatility and ease of operation, resulting in increased efficiency and production. For further details contact your nearest Dealer, or write for catalog.

famco  **machines**

FAMCO MACHINE CO., 3122 Sheridan Road, Kenosha, Wis.

CHECK THESE FEATURES

- 1 EFFICIENCY—Solenoid operated, positive-locking, 9-point clutch jaws for greater efficiency.
- 2 ECONOMY—Less maintenance; minimum production time losses.
- 3 SAFETY—Electrically controlled for safe operation, tooling.
- 4 LONG LIFE—Proved design, rugged, longer-lasting press.
- 5 EASE OF OPERATION—Feather-light foot or hand control.
- 6 SIMPLIFIED CLUTCH CONTROL—Selector switch for single-stroke, neutral, or continuous operation, while press is on or is not running.

how NORGREN lubricates an air cylinder with less than 1 cfm of air

Cylinder counterbalances "side head" of car wheel borer made by Niles Tool Works of the Baldwin-Lima-Hamilton Corp.

PROBLEM

To obtain dependable oil fog lubrication of air cylinder through $\frac{3}{4}$ " pipe with less than 1 cfm air flow (insufficient to operate any $\frac{3}{4}$ " lubricator).

SOLUTION

Use of Norgren Oil Fog Lubricator on a dead end pipe.

RESULT

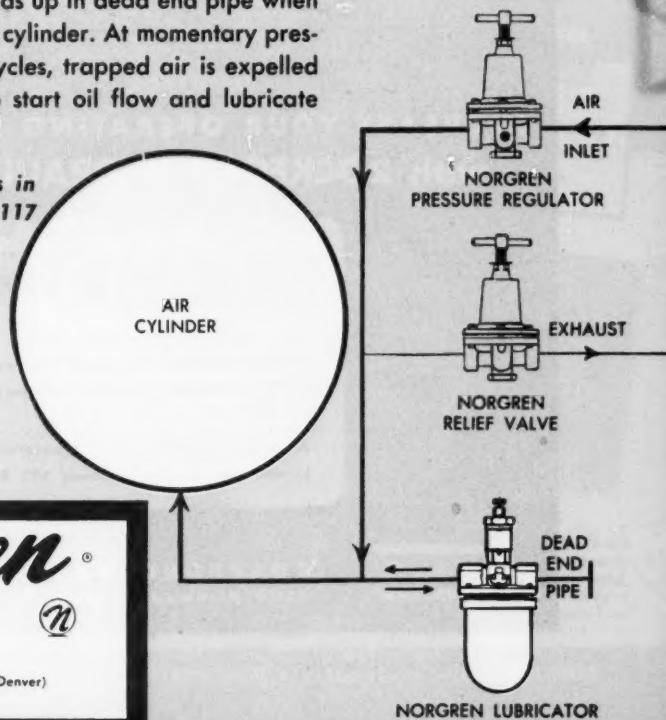
Air volume builds up in dead end pipe when air flows to and from cylinder. At momentary pressure drop between cycles, trapped air is expelled with sufficient cfm to start oil flow and lubricate cylinder.

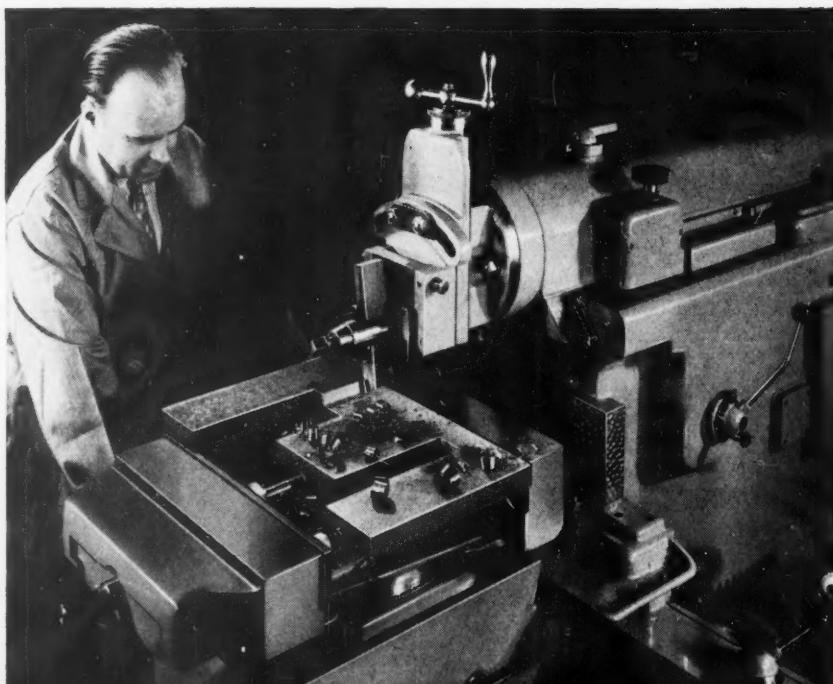
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Hydraulic drive permits you to change stroke lengths instantly, even while the shaper ram is in motion. It also gives you a wide range of cutting speeds and feeds, infinitely adjustable.

With flame-hardened and ground ram ways, Rockford Shapers assure long life and constant accuracy for maximum operating efficiency.

Ask a Rockford Machine Tool Co. representative to show you how you can increase your operating efficiency with Rockford Hydraulic Shapers.

528

Hy-Draulic

ROCKFORD MACHINE TOOL CO.
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how SURFACE DEFECTS impair bearing operation

No matter how smooth a ground surface may appear, examination will reveal imperfections in the form of grinder scratches and ridges, feed spirals, chatter marks and ridges, feed loosened metal splinters. Upon contact, these minute peaks and ripples interlock with the mating surface of the bearing, tending to rupture the protective oil film. Fragmented metal is torn from surfaces to mix with lubricant and cause abrasive wear.



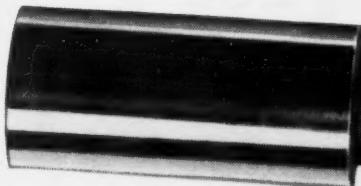
increasing clearance dimensions and shortening life. Photo at right shows an example of a scratched and galled surface which stopped rotation by "plowing" metal.



how SUPERFINISH

insures bearing life

Superfinish removes all surface defects such as grit scratches, feed spirals and the soft "smear metal" caused by grinding heat, and having removed the faulty layer—gets down to metal of the desired structure and hardness. At the same time, it produces a more nearly perfect geometrical form which supports a more efficient oil film for lubrication. There are no projecting defects to churn the oil film or cause metallic contact.



Load carrying capacity is substantially increased by Superfinishing. And bearing life is greatly prolonged.

you should know the facts about SUPERFINISHING!

It may surprise you to know what a quick and inexpensive process Superfinishing really is. It can greatly reduce the cost of grinding and, in many cases, eliminate such expensive operations as hand lapping and polishing.

If you have not yet read the booklet "Wear and Surface Finish," we will be glad to send you a copy of this authoritative text book with our compliments. Please request it on your company letterhead.



GISHOLT
MACHINE COMPANY
Madison 10, Wisconsin



THE GISHOLT ROUND TABLE represents the collective experience of specialists in the machining, surface-finishing and balancing of round and partly round parts. Your problems are welcomed here.

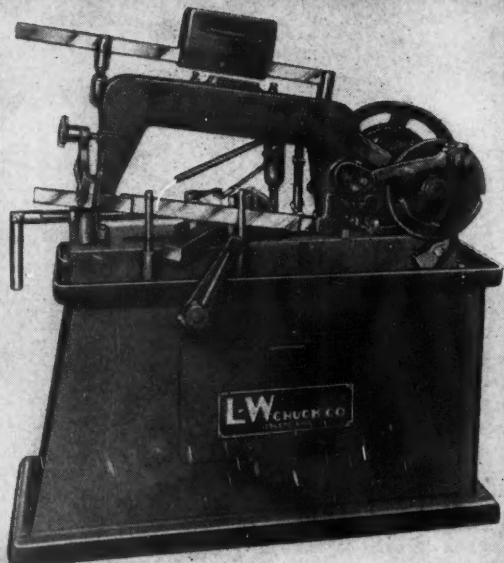
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r.p.m. Coolant pump base. Swivel vise for angle cuts. All steel welded base and table. V-belt drive. Rigid frame. Gravity feed. Length gauge. Expanding clutch. 3-speed (90 to 130 r.p.m.) V-belt motor drive arrangement, \$29.31, less motors. 1/2 H.P. 1725 r.p.m. motor recommended. Completely Motorized with Switch; Single Phase \$375.74; Three Phase \$382.53.

Order from your industrial supply distributor or order direct, giving name of your distributor.

Send for complete catalog giving prices and specifications on these quality, low-cost L-W Products



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NUCUT files are *different*. You can see the difference. Just hold the file at an angle—and you'll spot the exclusive **wavy** pattern made by NUCUT's *two* sets of teeth. It's this patented wavy construction that gives you superior cutting power.

The teeth do two jobs at every stroke. The coarse teeth cut fast, clean, without skidding. The fine teeth leave the surface smooth. Just as if two files were working at every stroke.

See your distributor. He knows NUCUTS, and will help you in selecting the right sizes, shapes and cuts.

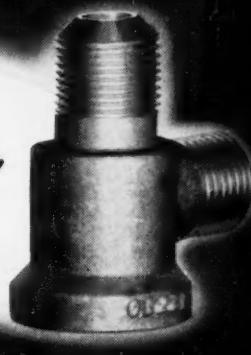
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"thread quality is up,
scrap is down"

on this unusual part

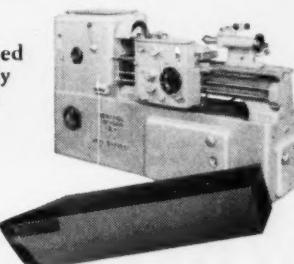


Mr. Hugh W. Riddle of the Ward-Riddle Co. wrote our headline when he described the versatility and speed of the Cri-Dan, using a single point carbide tool.

His production problem involved an aluminum casting for a flow control valve body.

With his Cri-Dans, the job, (virtually impossible on a turret lathe) is accomplished in a total of 56 seconds per piece with only $\frac{1}{2}$ of 1% scrap. This effects a tremendous savings in time, material and tool costs in addition to increasing production on the turret lathes.

If you have a threading operation—whether "run of the mill" or something unique, you can get the same speed and efficiency by contacting your Lees-Bradner representative now.

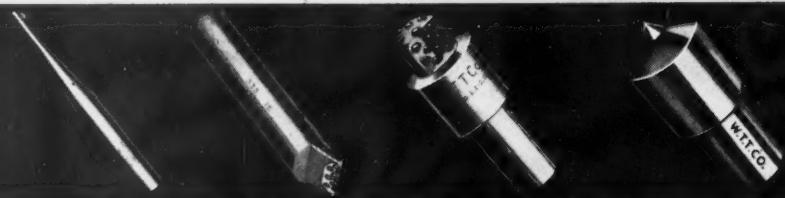


CRI-DAN B Single Carbide Tool,
High Speed Threading Machine

the **LEES-BRADNER**
CLEVELAND 11, OHIO, U.S.A. *Company*



WHEEL TRUEING TOOL



RADIUS FORMING
TOOLS

"TRU-LINE" PROFILE
DRESSING TOOLS

IMPREGNATED
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STANDARD
DRESSING TOOLS

NEW DIAMOND GRIT TOOL

makes big cut in thread grinding costs.

After two years of laboratory work and extensive production line testing we are happy to announce another important Wheel Trueing original—our new Diamond Grit Tool for dressing V and straight line form thread grinding wheels.

This new tool is a saturated concentrate of pure, sharp diamond grits in a special alloy matrix which wears so that there are always sharp grits exposed, giving effective cutting until the tool is used up.

Lighter dresses are effective, wheel life is increased and more pieces are produced per dressing. Remarkable savings have been demonstrated, one world known corporation reporting a projected annual saving in five figures.

Diamond grits are selected for each specific type of thread grinding operation. Write us in detail as to your needs and we will be glad to make a recommendation.

Please address your inquiry to our nearest company office.

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Pipe sizes:
1/4" to 2"

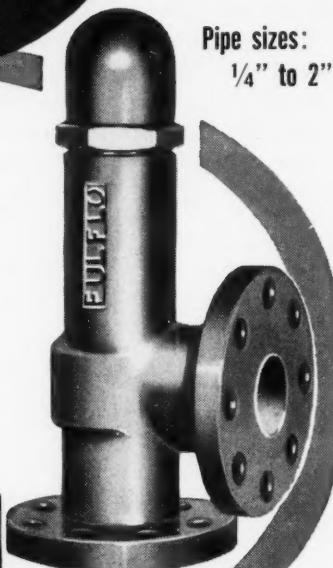
Simplest and quietest
valves on the market!

Install . . . that's all. No
maintenance needed. 5
springs to select pressure.

For ram presses, machine tool hydrau-
lic mechanism, Diesel and oil burning
equipment.

NON-CHATTERING
because the cylindrical piston does not
seat abruptly against valve. This re-
lieves pounding or chattering noise in
valves using conventional seat.

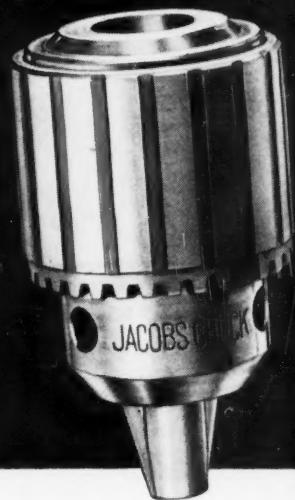
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FULFLO
MECHANICAL
DATA BOOK



Standard
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THE FULFLO SPECIALTIES CO. Inc.
BLANCHESTER, OHIO

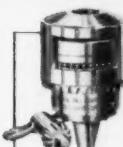


FIRST...from any global viewpoint

World's Most Widely Used Chuck is the Jacobs Plain Bearing Chuck, first choice the world over for light and medium duty drilling. Rugged construction, high-precision accuracy, and tremendous gripping power are the reasons why.

Jacobs Chucks are stocked and sold by your Industrial Supply Distributor.

The Jacobs Manufacturing Co., West Hartford 10, Conn.



The Jacobs Ball Bearing Super Chuck, designed particularly for heavy duty drilling, has the most powerful grip ever developed in drill chuck history.

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JACOBS
IT HOLDS**

HYDRATROL LATHES

LARGE HOLLOW SPINDLE TYPE

Check These 3 Points of...

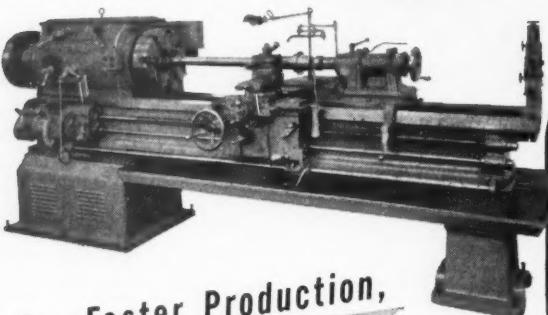
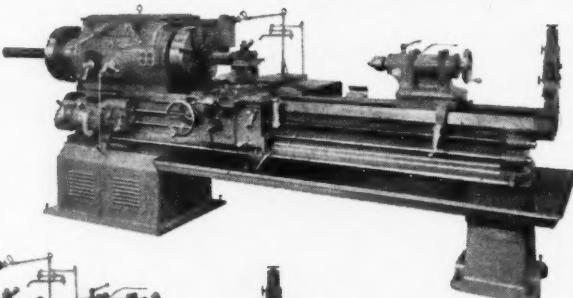


versatility

- 1 Machine long work chucked through spindle.
- 2 Machine work between centers.
- 3 Also built with beds and carriages on each end of headstock for machining both ends of a shaft at one time.

Both Illustrations Show
the 18" Hollow Spindle
7½" Hole

SIZES 18" TO 36"
Small - 18" & 20" up to 7½" Hole
Medium - 25" up to 12" Hole
Large - 32" & 36" up to 16½" Hole
(Standard Type Lathes 16"-36")



For Faster Production,
Better Work, Lower Costs!

IMPORTANT FEATURES

Timken Bearing Spindles.

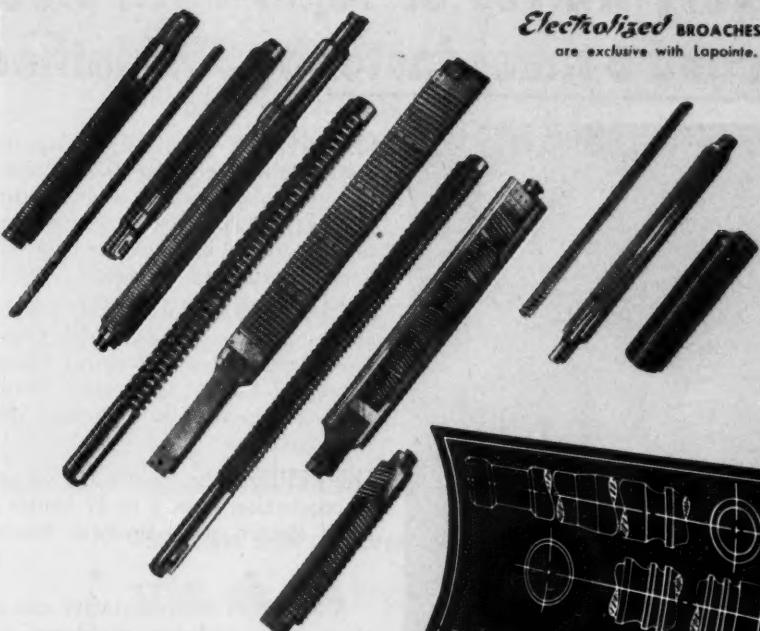
Hydraulic clutches for forward and reverse, controlled from apron or headstock.

Hydraulic brake for close position control.

Hydraulic clutches self-compensating. No adjustment and full power capacity at all times.

LEHMANN
MACHINE COMPANY

CHOUTEAU AT GRAND • SAINT LOUIS 3, MISSOURI



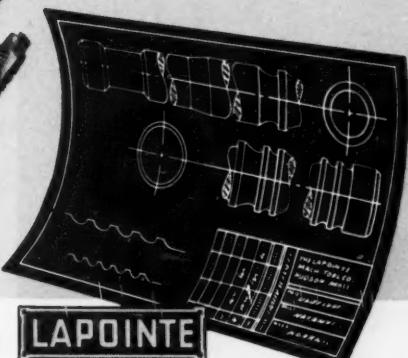
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BROACHES

engineered by

embody all the accumulated experience of our 50 years as pioneers in the art of broaching. This valuable "know-how" is put at your disposal every time you send us an order or an inquiry.

Being the world's largest manufacturer of broaching machines and broaches, it is of



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course to be expected that our facilities for producing broaches of any size or shape, in any quantity, cannot be equalled.

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Branch Factory: Watford, Herts., England



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liveries from 20 to 40
g.p.m. at 1200 r.p.m.



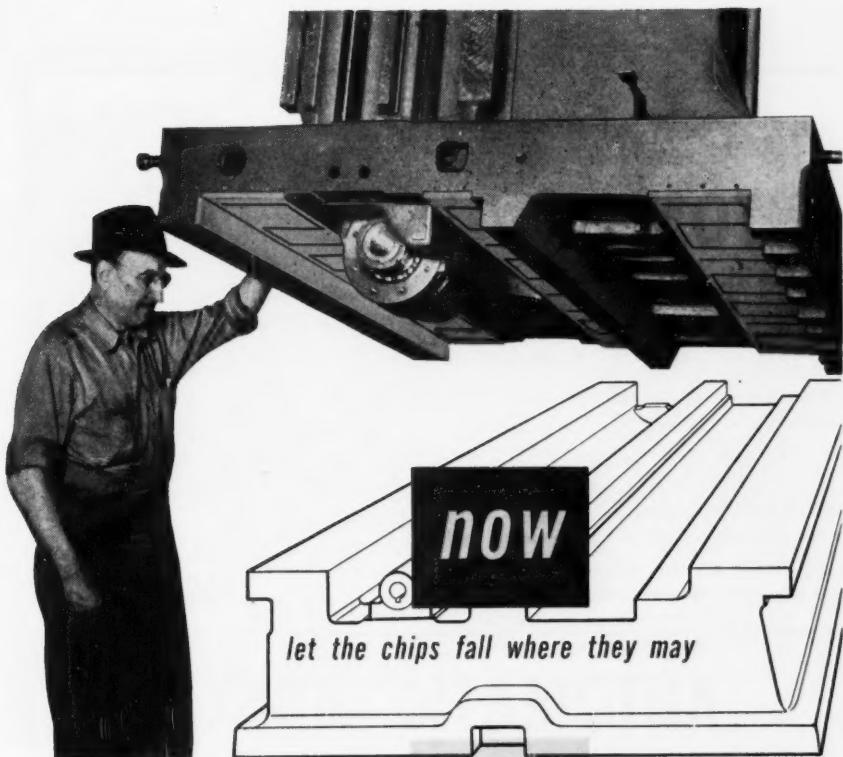
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mittent to 1500. De-
liveries from 3 to 12
g.p.m. at 1200 r.p.m.

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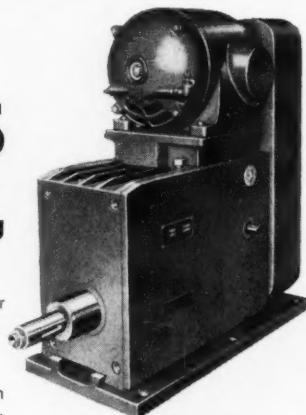
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Units are universal in application . . . let us show you their application to your job.

Made in two sizes—No. 1 and No. 2 Morse Taper.

This simple unit gives high production at a lower cost. When used in multiples to complete operations, no relocation of part is necessary, thus producing more accurate work.

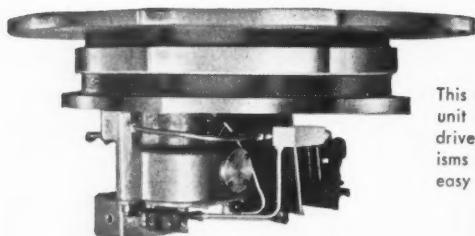
Semi-skilled operators will deliver high production accurately and efficiently, yet with a minimum of supervision.



*Here is a packaged unit
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Meets Demand For Drilling and Tapping Equipment

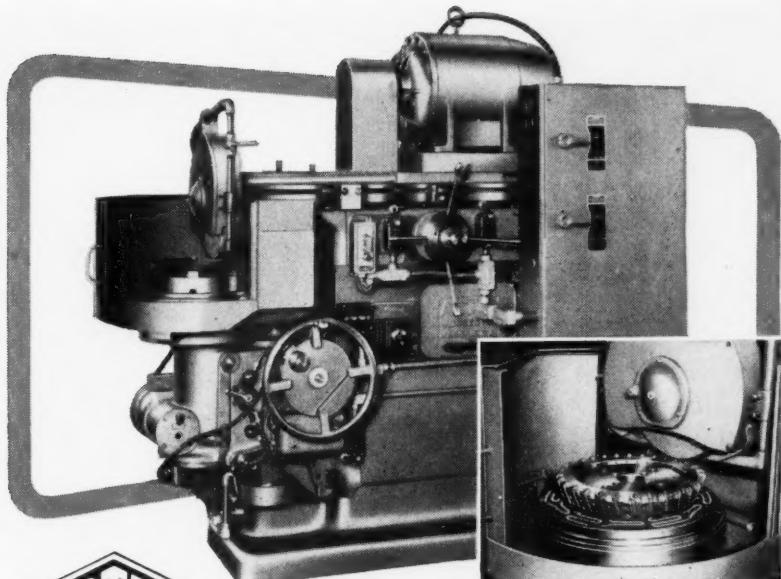


Made in sizes 16", 20", 24", 30", and 36" diameter. Indexes, 3 to 12 stations.

This Index Table is a self-contained unit, built on unit construction principle and includes motor drive assemblies. All drive and control mechanisms underneath table for free work surface . . . easy accessibility.

Consult the yellow pages in your phone book
—under Machine Tools—for our nearest representative, or write direct to our factory.

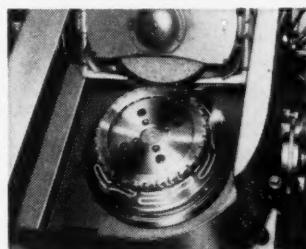
THE *Avey* DRILLING MACHINE CO.
Cincinnati 1, Ohio



ARTER MODEL D
HYDRAULIC ROTARY SURFACE *Grinder*

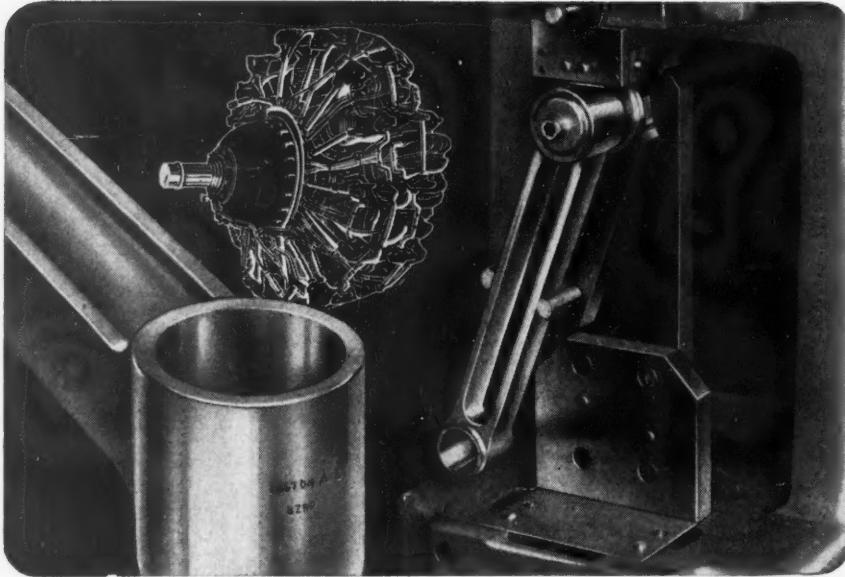
...for work requiring the utmost precision for flatness, size and finish. For angular grinding, a rigidly mounted spindle insures concentricity. Electric magnetic chuck, 13" or 17", holds work as small as 1½" diameter. Smaller parts held by shellac on iron plate. Shoulder, fillet diameters ground with side of wheel.

Inserted carbide tooth milling cutters ground on standard machine. Extra equipment permits revolving grinding wheel and chuck in either direction, independently controlled.



Machine built especially for grinding 45° angles on cutters. Flat surfaces also can be ground. Both wheel and chuck have reversible direction drives.

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Roll-O-Mark saves 527 hours per month on Single Precision Marking Operation

This important saving is reported by a leading aircraft engine manufacturer on marking linkrods with the all-pneumatic NOBLEWEST Model 50P1. This new marking machine, named the Roll-O-Mark, is the leader in the medium priced general purpose marking machine field. It utilizes the original NOBLEWEST roll-marking process which permanently rolls in inscription markings that last as long

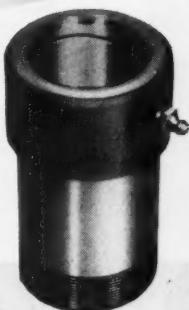
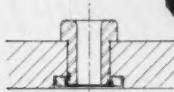
as the product itself. Roll-O-Mark is ideal for trade marking, part or patent numbering, codifying and serial numbering and will mark flat or round surfaces. For information on how Roll-O-Mark and other NOBLEWEST equipment can cut costs in your plant, write The Noble & Westbrook Mfg. Co., 25 Westbrook St., East Hartford 8, Connecticut.



**LAMINA
GUIDE
PIN
BUSHINGS**
BRONZE PLATED ON
HARDENED STEEL

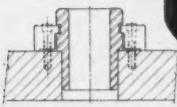
**NUT
TYPE**

Is secured in shoe by tightening nut on end of bushing. Nut is located in counter-bore in shoe for flush assembly.



**CLAMP
TYPE**

Is secured in shoe by means of two or more clamp fingers which grip shoulder on bushing head.



DISTRIBUTORS: A few desirable territories are open to qualified distributors. If interested, please write for details.

PATENT PENDING

...now in two styles

The bushing that gives you the long-wearing features of hardened steel yet provides the seize-free, score-free performance of soft bronze is now available in the two styles at the left.

The Lamina Guide Bushing is hardened steel with free-running bronze electroplated on the inside diameter. A $\frac{1}{2}$ " oil groove further lubricates the inside of the bushing in a double figure-eight pattern. Ordinary grease is fed to the groove through a standard Alumite fitting.

In addition to the improved wearing qualities of the Guide Bushings, Lamina Guide Pins give longer service, too. Made of water-hardening tool steel, these pins eliminate the brinelling and "mushrooming" characteristic of case-hardened pins when driven into the die shoe.

Both styles of these bushings are stocked in a variety of lengths and diameter for straight, shoulder and removable pins. Lamina Dies and Tools, Inc., 14922 W. Eleven Mile Road, Berkley, Michigan.

This new brochure fully illustrates Lamina facilities, dies, tools and die making equipment. Send for your copy; there is no obligation.



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DIES AND TOOLS

CONVERTICAL QUILL TRAVEL MILL ATTACHMENT



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New!

PRECISION MADE BY

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- Micrometer depth stop
- Positive Quill lock
- Forward, stop, reverse control

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- Full use of table travel
- Time-saving settings
- Quick, easy speed change
- Light, efficient rigid

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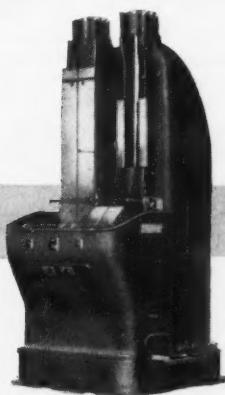
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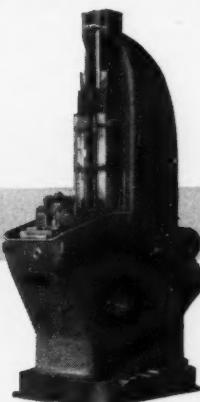
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Chicago 39, Illinois

FOR HIGHER PRODUCTION
investigate surface broaching
for difficult machine work...



Duplex Surface
Broaching
Machine. Made
in 5, 10, 15 and
25 Ton Sizes.



Single Slide Surface
Broaching Machine.
Made in 5, 10, 15
and 25 Ton Sizes.

Many types of work can be surface broached on Footburt machines at remarkable savings over previous machining methods. High production is obtained with required accuracy and finish. Holding fixtures are designed for quick, convenient loading. Cutting tool maintenance costs are low. We will be glad to work with you on the application of surface broaching.

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Detroit Office: General Motors Building



Continuous Type Broaching
Machine. Made in 4 Sizes.

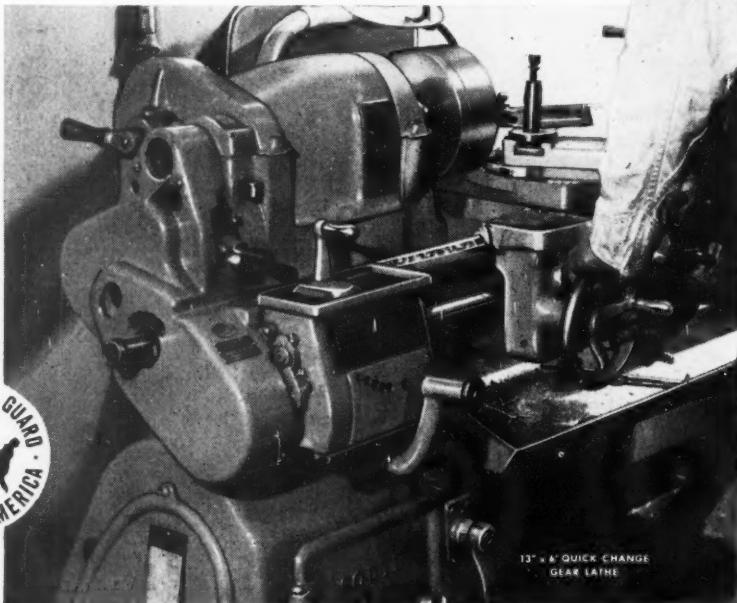
FOOTBURT

surface broaching for difficult machine work

SOUTH BEND 13" LATHES

for Accurate, Low-Cost Machining

South Bend 13" Lathes are popular wherever there are a variety of precision parts to be machined. These quality-built lathes are fast and simple to operate. Set-ups and job change-overs are quickly and easily made. Maximum production at highest accuracy and lowest cost will reduce expenses in your shop. Write for complete information on South Bend Lathes and other machine tools.



SWINGS: 13-1/8" over bed and saddle wings;
8-3/4" over saddle with chip guard removed.

BED LENGTHS 4, 5, 6 and 7 feet

DISTANCE BETWEEN CENTERS 16 to 52 in.

MAXIMUM COLLET CAPACITY 1" (Collets interchangeable with South Bend 10"-1" collet,
14-1/2", 16", and 16-24" South Bend Lathes.)

SPINDLE BORE 1-3/8 inches

SPINDLE SPEEDS: Eight 40 to 940 r. p. m.

POWER LONGITUDINAL FEEDS: 48 R. H. or

L. H., .0015" to .0841"

POWER CROSS FEEDS: 480006 to .0312"

THREAD CUTTING: 48 R. H. or L. H. pitches . . .
4 to 224 per inch

CROSS SLIDE TRAVEL 8-1/8 inches

TAIL STOCK SET OVER 15/16"

SOUTH BEND LATHE

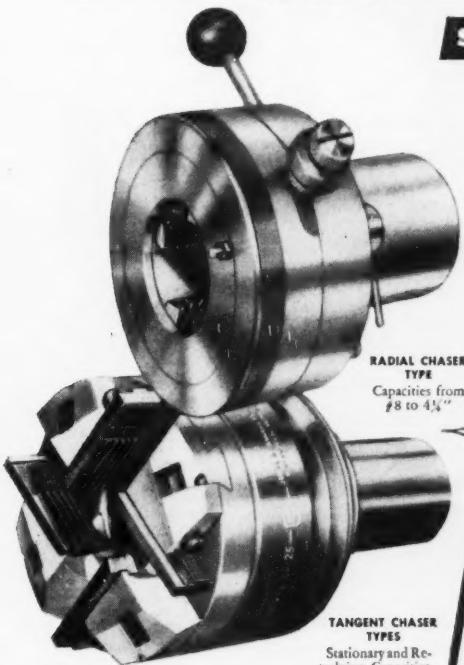
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Building Better Tools Since 1906



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J & L Automatic Opening Die Heads are sold with this guarantee: that your threads will be held consistently within the exacting Class III tolerances for form, lead and pitch diameter, throughout the long life of the J & L chasers.



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This gives you a freer cutting tool, operating with minimum wear and repetitive Class III accuracy. The high precision of the J & L chasers is maintained in the Die by exclusive chaser holding features.

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J & L chasers are resharpened independently of the holders or dies. Instructions are simple, easy to follow. Eliminates guesswork. Exclusive holding features assure accurate resetting.



Only J & L Die Heads and Chasers give you ALL these features. Write to Dept. 710 for illustrated catalogs and complete information.

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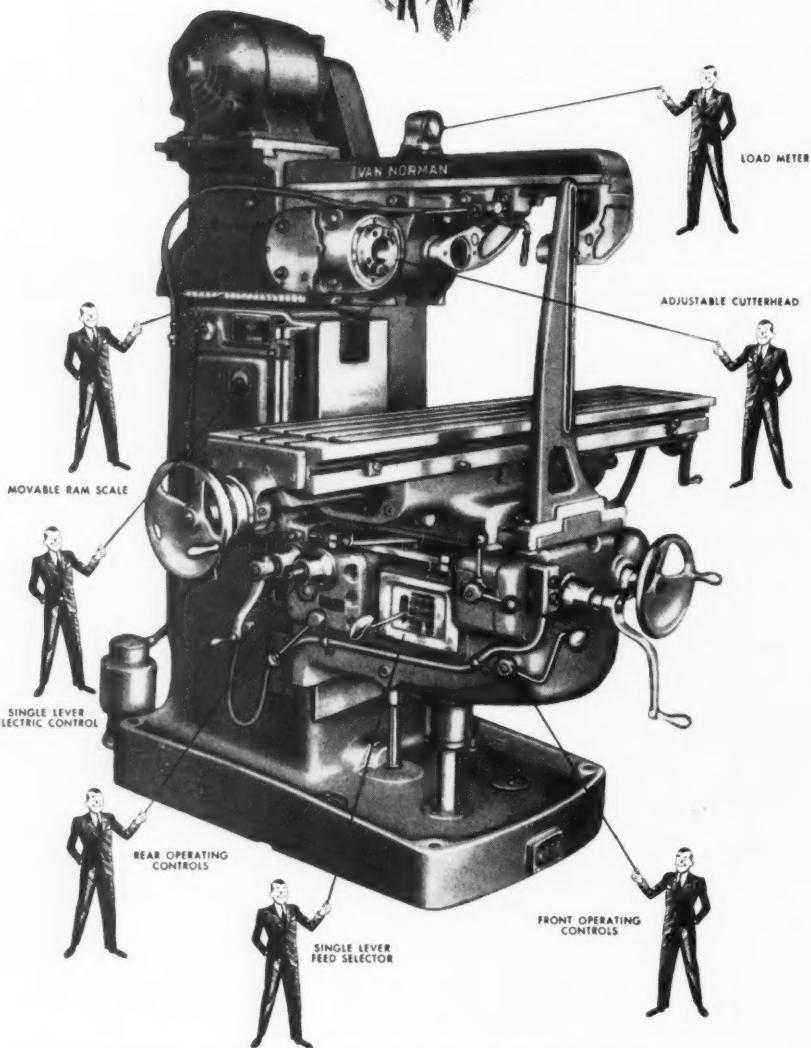
JONES & LAMSON MACHINE CO., Springfield, Vt., U.S.A.



Machine Tool Craftsmen
Since 1835

DIE HEAD DIVISION

Look at the



"IT PAYS TO VAN NORMANIZE"

Production Advantages of the **VAN NORMAN** **RAM TYPE MILLER**

Regardless of the type of plant or the type of work, Van Norman Ram Type Millers can cut your milling costs and speed vital production. These versatile millers reduce idle machine time by as much as 50% because they enable the operator to perform conventional horizontal, vertical and angular milling on *one* machine. Look at what Van Norman Ram Type Millers can do for you —



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By merely positioning the cutter head, the operator can perform horizontal, vertical or angular milling . . . the work of three single-purpose machines.



Increased Work Range

Movable ram plus the saddle crossfeed increase the work range and capacity of the miller . . . enable you to handle larger work pieces with ease.



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Operating controls are located at front and rear for ease of operation. They eliminate back and forth operator motion . . . reduce operator fatigue.



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Built-in electric controls simplify operation. Single lever selector controls spindle, feed, and coolant. Push button, on front of knee, starts and stops motors as pre-selected.



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Built-in load meter indicates percent of load at which the cutter is operating. It enables the operator to operate miller at maximum efficiency . . . helps to prevent overloading of the miller motor.

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Van Norman Ram Type Millers are available from 37" to 64" table lengths.

Write for complete information, today.

VAN NORMAN COMPANY
Springfield 7, Massachusetts

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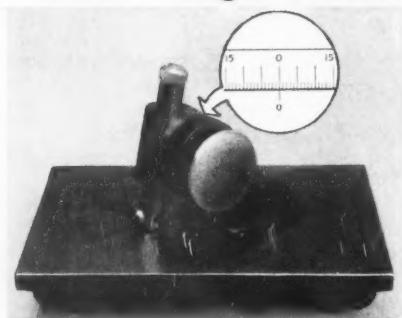
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"MAGIC" Angle Dresser



"MAGIC" Diamond Holder

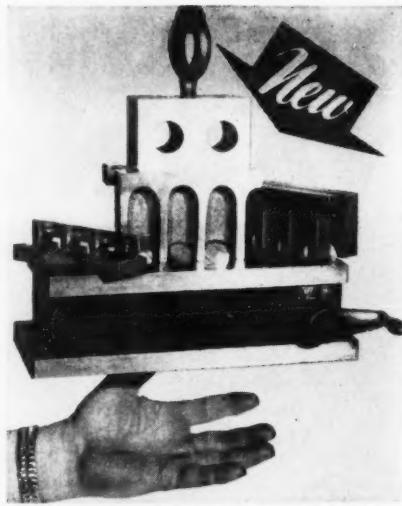
Place the diamond to the wheel

- Saves elevation screw and nut.
- Saves spindle housing or knee ways.
- Saves gears and bearings.

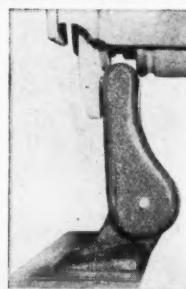
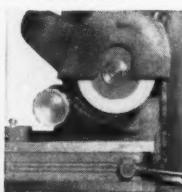
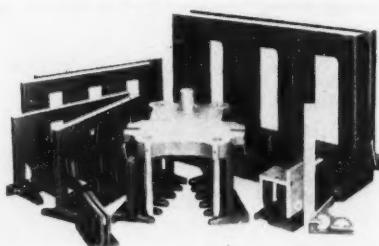
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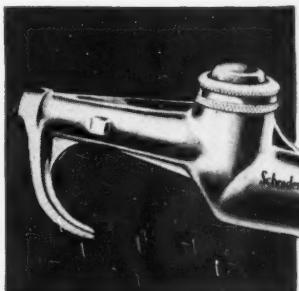
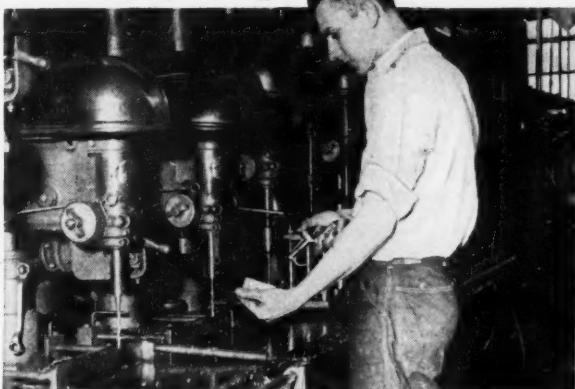
MAGIC CITY MACHINE TOOL CO.
2128 S. WALNUT ST., MUNCIE, INDIANA



"MAGIC" Parallels



Put air at your fingertips with a Schrader Blow Gun



Schrader 9326 Blow Gun—One of thirty-six designs and styles for you to choose from.

You'll find there are Schrader Blow Guns that *just suit* any operation you may have . . . reliably and economically. The #9326 Schrader Blow Gun shown here, for instance, will take the toughest treatment.

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- **It's convenient**—Notice the handy hang-up hook. Hang the gun close to where you need it . . . and remember, this hook acts as a guard, to keep hands away from moving parts.
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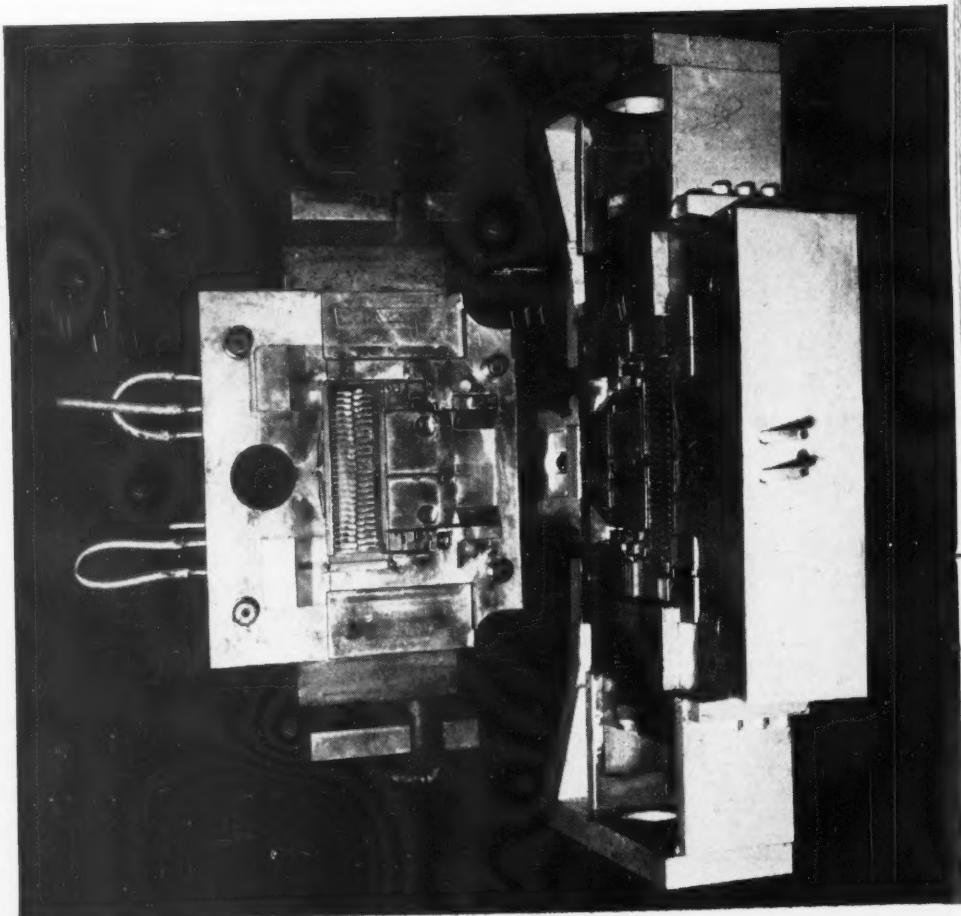
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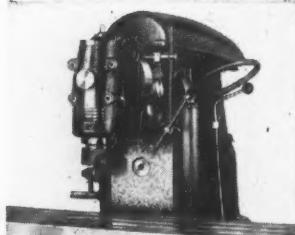
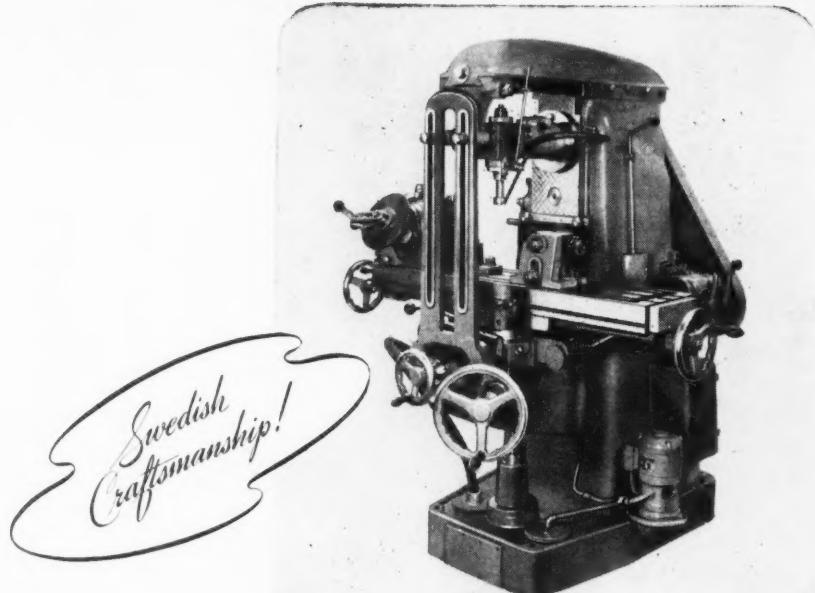
resistance of POTOMAC M to wear, to heat checking, and to metal wash. Allegheny Ludlum makes a complete line of steels for hot-work tooling of various kinds—so, whether your need is the mass producing of duplicate parts or fabricating a few of them, call up or write "A-L" every time for hot-work counsel or service or both. Just tell us your requirements.

- *Allegheny Ludlum Steel Corporation,
Henry W. Oliver Bldg., Pittsburgh 22, Pa.*



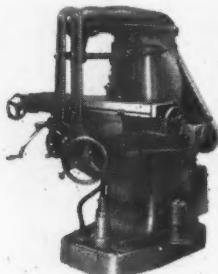
For complete MODERN Tooling, call
Allegheny Ludlum

ADDRESS DEPT. MS-35



Sajo Vertical Milling Attachment

The Sajo "Plain" Milling Machine



the SAJO "UNIVERSAL" MILLING MACHINE

exemplifies the expert workmanship that is traditional in Swedish machine tools. Like all SAJO Millers, this new Universal Milling Machine was designed and built to the highest standards of quality and practical utility.

Avoidance of exterior "luxury" features, slight in value but substantial in cost, and concentration on the vital factors of construction, enable the SAJO to deliver top performance at moderate cost.

SAJO Millers are available in Plain and Universal types, with longitudinal power table feed only, or with power feed in all directions. Screws and dials are in the U. S. inch system.

★ Standard Equipment includes:
3 HP motor and starter equipment, motor driven coolant system, adjustable table feed nut to allow climb milling, 1" arbor, arbor support brace.

★ Extra Equipment:
Universal Dividing Head, Vertical Milling Attachment, Slotting Attachment, Swivel Base Vise, Rotary Table.

CONDENSED SPECIFICATIONS

Table Size	4 $\frac{1}{2}$ " x 9 $\frac{1}{2}$ "	Precision anti-friction bearings on spindle and gear shafts
Longitudinal travel: Plain Miller	24 $\frac{1}{2}$ "	One-piece column and base
Universal Miller	27 $\frac{1}{2}$ "	Net weight - 2200 lbs.
Transverse travel	8 $\frac{1}{2}$ "	
Vertical travel	19"	
12 spindle speeds	36-1540 RPM	
Table feeds	12	
Taper in spindle	No. 40 NMT	
Main motor	3 HP	

Write for Catalog



NO PRIORITY — PROMPT DELIVERY — ATTRACTIVE PRICE
AUSTIN INDUSTRIAL CORP. 76-H MAMARONECK AVE.,
WHITE PLAINS, N.Y.
DEALERS IN PRINCIPAL CITIES

They saw it either way

... was believing for a group of mechanical officials from one of the mid-west's largest earth moving equipment

forgings. So they came to see for themselves and they saw:

- Cuts $1\frac{3}{8}$ " deep.
- Cutting speed 300 feet per minute.
- .030" feed.
- 60 horse power registered by horse power meter during the maximum cuts.

Not a shimmy or whimper from the machine.

They were amazed and convinced.

The model Pacemaker is endowed with power, stamina and convenience which combine to produce a thoroughly dependable and highly productive unit.

Want to know more? Write for Bulletin No. 44 tells all... have one?

LATHES AND RADIAL DRILLS

DIAL FOR ACCURATE

High Speed Inspection



Depth Gage.
Readings to
1/1000th.



1" Range
Dial Indica-
tor. Adapt-
able to many
tools. Read-
ings to
1/10,000th.

When your production must be held to close tolerances there's a Tumico Dial Indicator gage that will make high speed, accurate inspections. High visibility dials give instant and accurate readings. Our complete and diversified line may provide exactly the right type of dial indicator gage to best speed and insure accurate inspections.

Let our engineers examine your product inspection problem. Write for new catalog showing additional models.

DIAL FOR ACCURATE

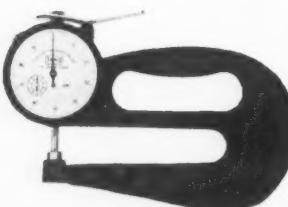
High Frequency Checking



1" Range
Dial Indica-
tor. Attaches
to many
tools. Read-
ings to
1/1000th.



Lever Action
Hand Thick-
ness Gage
with 1"
Throat Depth.
Readings to
1/1000th.



Lever Action
Hand Thick-
ness Gage
with 4"
Throat Depth.
Readings to
1/1000th.

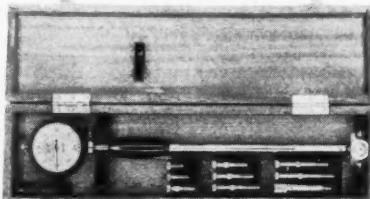
"Quality Control" of production lines can often be improved and speeded up by frequent spot checking with Tumico Dial Indicator hand and bench gages. High visibility assures quick, accurate readings to check vital production points.

Our production engineering department may be able to help you. Write us your problem. Our recommendations and complete catalog showing gages not illustrated will be sent promptly.

TUMICO DIAL INDICATORS

TUBULAR MICROMETER CO., Box 40, St. James, Minn.

Dial Bore Depth Gage. Range from 2" to 6"
in 10" Bore Depth in 5/10,000ths.



master MACHINE TOOL ATTACHMENTS

for
**LATHES
TURRETS
MILLS**
OR USE INDEPENDENTLY



1. 90° Universal Milling Head
2. Hi Speed Milling and Drilling Head
3. Deep-Hole Internal Grinder Head
4. Basic Milling Unit
5. Milling and Grinding Table

6. Universal Feed Table
7. Internal Grinder Head
8. External Grinder Head
9. Slotting and Keyseating Head
10. Geared Dividing Head

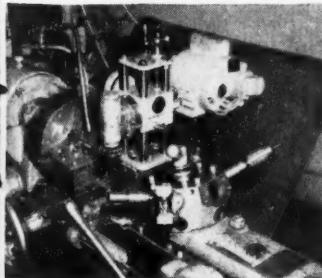
THREE SIZES

MODEL "C," $\frac{1}{2}$ hp — 9" TO 13" LATHES
MODEL "B," $\frac{1}{2}$ OR $\frac{3}{4}$ hp — 13" TO 18" LATHES
MODEL "M," 1 OR $1\frac{1}{2}$ hp — 18" TO 72" LATHES

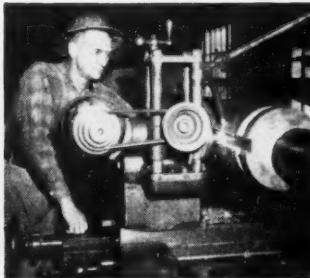
The Master attachment can be used profitably on many production operations. Mount it on your present equipment, lathes, turrets, mills, or use independently to perform additional operations in the same set-up. The basic milling unit with the above types of precision heads gives you facilities for milling, grinding, boring, drilling, indexing, slotting, and keyseating, internal and external. Its full complement of equipment is an outstanding value for maintenance, repair, tool room, and

experimental shops, as well as production, thus performs a full range of shop operations at a minimum investment. These improved models are outstanding in rigidity, capacity, and simplicity of set-up and operation and incorporate the latest features developed in our 17 years of manufacturing this tool. Investigate this valuable shop tool. For the cost of one single-purpose machine, you can have several Master units producing. Prompt deliveries.

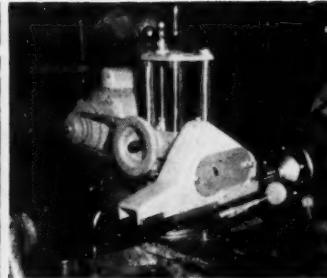
MAKES LOW-COST INDEPENDENT PRODUCTION SET-UPS — PORTABLE — SELF-POWERED



Milling on turret lathe completing part in one set-up



End Milling 2 1/4" keyway in 9 7/8" diameter shaft 22 ft. long



Master Slitting Head on lathe cutting internal taper keyway

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MASTER MANUFACTURING CO.

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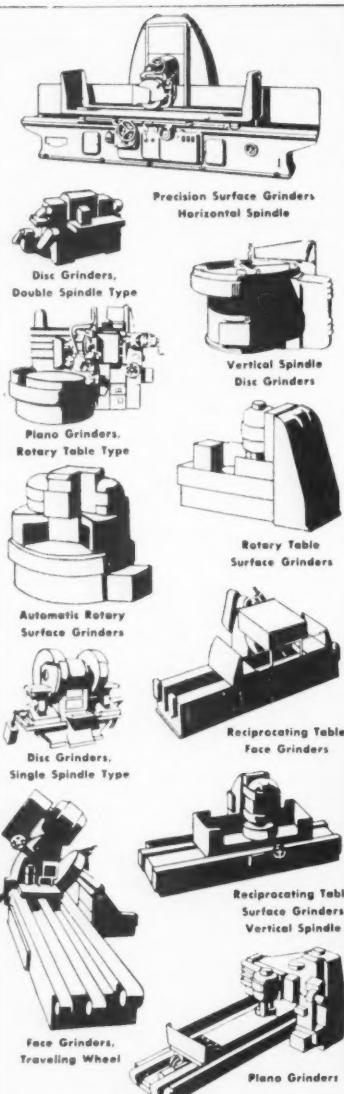
MATTISON GRINDERS

*If it's a Flat Surface to Grind
There's a Mattison to Grind it.*

With the addition of the production grinding machinery formerly made by the Hanchett Manufacturing Company, Mattison now is in a position to work with you on all your surface, face and disc grinding problems. These machines are made in various types to handle a wide range of work. Experienced fixture engineers are available to give you best production efficiency with Mattison Machines.

For any flat grinding, ask for our recommendations on the proper method and machine for your job. No obligation, of course.

For catalog on all machines, ask for free copy of general bulletin.



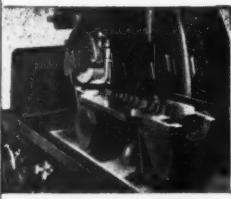
MATTISON

ROCKFORD - ILLINOIS

MACHINE WORKS

900 connecting rods per hour, using 40 station fixture to finish grind crank and wrist pin end of assembled rod with Mattison No. 72 Grinder

Shows variety of work run on Mattison Face Grinders



40 hours before — now 4 hours. Pump case ground on Mattison Horizontal Spindle Precision Surface Grinder



320 surfaces of cast iron compression heads per hour, removing 1/32" stock with Mattison No. 24 Rotary Surface Grinder





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by skilled technicians,
factory service and guarantee,
and spare parts readily available
from every Hirschmann Branch.

Typical as to precision and as to fame of trade name.
Tornos R10 Swiss Automatic Screw Machine.

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INSTRUMENTS
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Vertical Micrometers
CHUCKS
Keyless Drill
DIAMOND & OTHER ABRASIVE WHEELS
DIE SETS
DIE SINKERS
DRILLING & TAPPING MACHINES
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Precision
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Automatic
GEAR HOBBLING MACHINES
GRINDERS
Tool • Twist Drill
GRINDING MACHINES
Hydraulic • Hydraulic Cylindrical
Jig • Optical • Universal
INDEX HEADS
Universal
JIG BORERS

JIG GRINDERS
LAPPING MACHINES
LATHEs
High Production • Rapid Copying
Toolmakers • Turret & Repetition
MILLING MACHINES
Cam • Production • Surface • Toolmakers
PANTOGRAPHs
POLISHING MACHINES
PRESSES
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Bench • Cam • Die • Heavy Duty
Hot & Cold • Shaving
SCREW MACHINES
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High Speed Steel
TURNING MACHINES
Semi-Automatic

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**8 LUGS
BROACHED
*in 33 seconds***

To produce eight single lugs on the end of a steel sleeve was a problem recently given to Detroit Broach.

After analysis of the operation, Detroit Broach recommended a single ram vertical surface broach to do the job. One of the problems within the job, in addition to increasing output, was the necessity of holding a close tolerance between the lugs.

The vertical broaching machine was set up with a two-station fixture which power-clamps the parts. A single pass of the broach forms four lugs across the sleeve. The sleeve is then indexed 90° and the other four lugs are formed. Complete cycle time—33 seconds per completed part. Slot tolerances are easily held and surface finish on the lugs requires no additional machining.

This is just typical of the specialized broaching techniques evolved by Detroit Broach for leading manufacturers. You, too, may have an application that can be materially reduced in time or cost by the economy of broaching or by review of present broach tooling. It will pay you to consult Detroit Broach for engineering or production data.

WORLD'S LARGEST MANUFACTURER OF BROACHES AND BROACHING TOOLS EXCLUSIVELY



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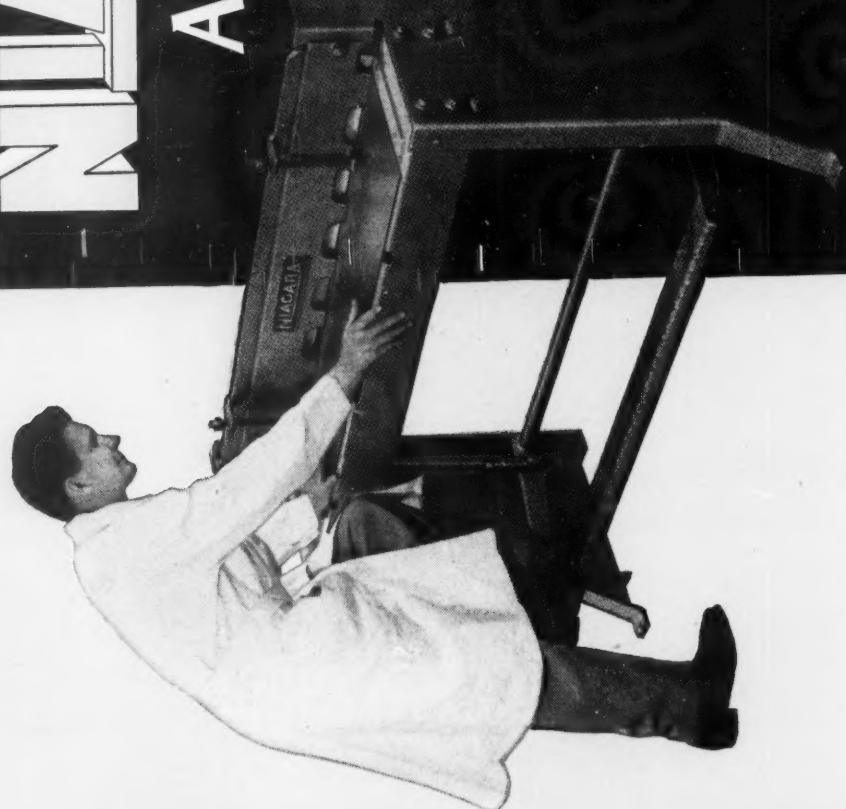
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Low Cost 48" Wide 16 GAGE CAPACITY engineered for easy, lively action

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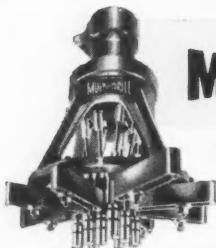
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Commander PRODUCTION TOOLS

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Adjustable MULTI-DRILL

- Adjustable To Any Hole Pattern
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Increase production up to 800%—save time, cut costs. Mounted without alterations or special tools. 9" drilling area; centers to $\frac{1}{2}$ ". Extension Spindles available to increase area to $22\frac{1}{2}$ ". Special adaptations available.



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- Quick, easy set-ups for Multiple Drilling of angle holes
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MULTI-ANGLE DRILL UNITS provide unlimited freedom of set-up for long or short run multiple hole drilling jobs. May be mounted on fixtures, jigs or bolted to drill press table. Save time, cut costs on angle drilling. Used with any drill press or suitable power source.



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- Drill SHALLOW or DEEP Holes up to 400% Faster
- Drill 10 diameters or more in depth without clearing drill
- Better, Smoother, More Accurate Holes



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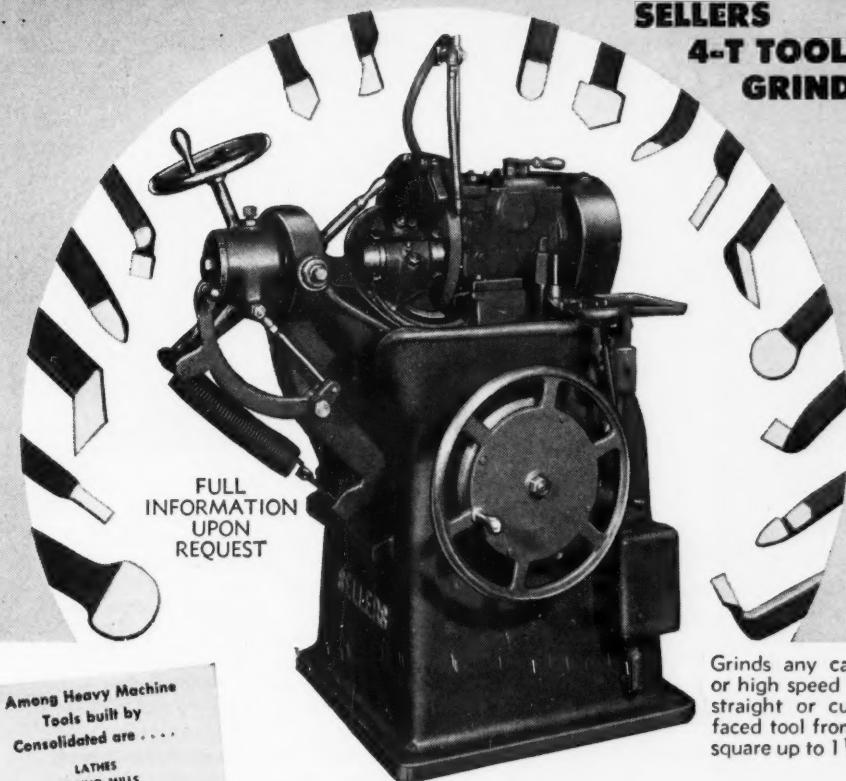
Commander MFG. CO.

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BETTER TOOL GRINDING MEANS LOWER PRODUCTION COSTS

**SELLERS
4-T TOOL
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Among Heavy Machine Tools built by Consolidated are . . .

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AND OTHER SPECIAL MACHINES

Grinds any carbide or high speed steel, straight or curved, faced tool from $\frac{1}{4}$ " square up to $1\frac{1}{2} \times 2"$

The grinding precision and uniformity of Sellers Tool Grinders are the result of the Sellers Line Contact Principle of grinding, accomplished by moving the work up and down in a straight line tangent to the periphery of the grinding wheel, in this way allowing the work to contact the wheel along a line only. Proper rake and clearance angles at the cutting edge are quickly and economically obtained. The operation is so simple that a tool-room attendant can easily maintain tools for the entire shop.

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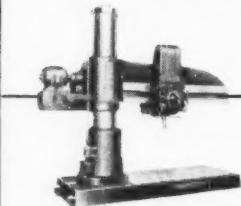


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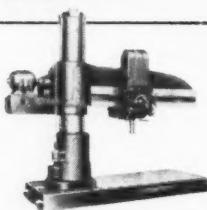
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you make money by saving . . . because Carlton Radial Drills cost little to operate and maintain.

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you make money by increasing hole production. Carlton's are designed, engineered and built to drill, ream and tap more holes per hour accurately and over a longer useful life.

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He's proud of Brighton Screws . . . they're a real quality line . . . meeting all of your requirements, including the highest standards of strength, accuracy and uniformity.

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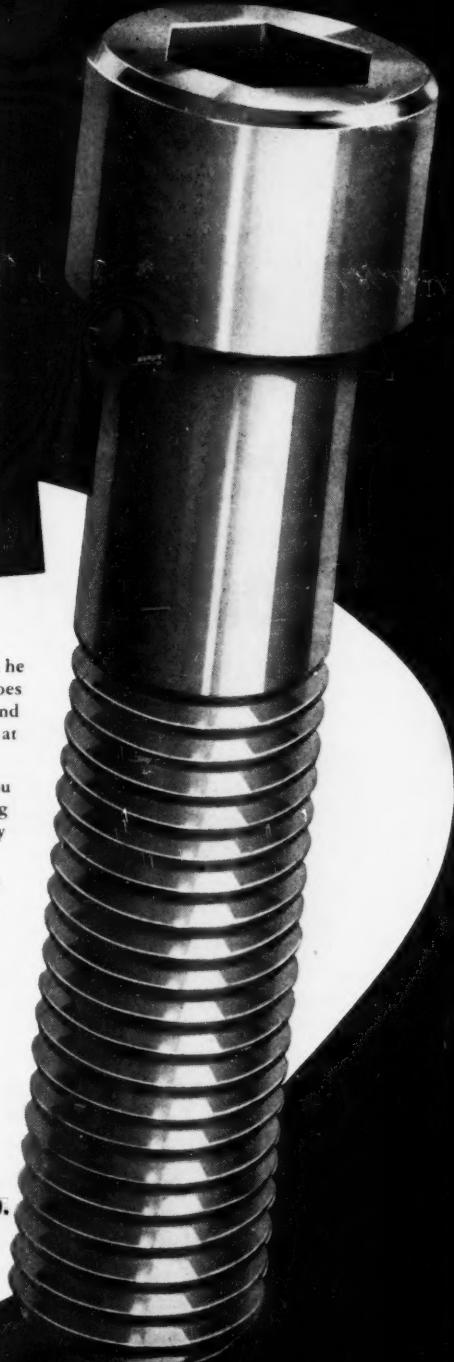
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On Buckeye electric tools, the pinion is detachable and is easily replaced without even disturbing the rotor and shaft, which are dynamically balanced to insure smooth, quiet operation.

In short, whenever you do have to replace a worn pinion, you can save \$28.75, plus a great deal of maintenance time and effort—if you're using Buckeye electric tools.

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IN CANADA: Joy Manufacturing Co. (Canada) Ltd., Galt, Ontario

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INFINITE CONTROLLED SPEEDS 30,000 TO 65,000 R. P. M.

**Easily connect jig grinder
to jig borer or mill**

Then you can finish grind in hardened steel to "tenths" . . . jig grind dowel holes square with a ground base . . . move location of holes in hardened steel blocks . . . jig grind interchangeable holes in hardened sections . . . grind small holes with diamond impregnated mandrels . . . grind contours and relief with tungsten carbide burrs . . . grind radii in die sections . . . eliminate jig bushings in tools where close spacing is essential.

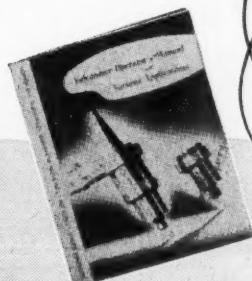
*Dependably accurate to "tenths"

**Other infinitely controlled
air driven spindle applications**

Place spindle on most any machine. Use it for finishing contours on hardened steel working surfaces . . . burring or milling die castings . . . routing wood contours . . . carbide milling or finishing slots . . . finishing holes in hardened steel to "tenths" . . . grinding with diamond wheels, carbide burrs, or diamond impregnated mandrels.

Advantages—10 micro finishes using carbide mills . . . 5 micro finishes using mounted points, operates at any angle . . . air driven, air cooled, overheating prevented . . . speed controlled at optimum point . . . 3 $\frac{3}{4}$ " long motor uses little working space . . . By controlling speed at any point you abolish need for many constant speed spindles.

For immediate quotation please state machine tool application. Get this manual of photos showing operations Vulcanaire performs.



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VULCAN TOOL CO.

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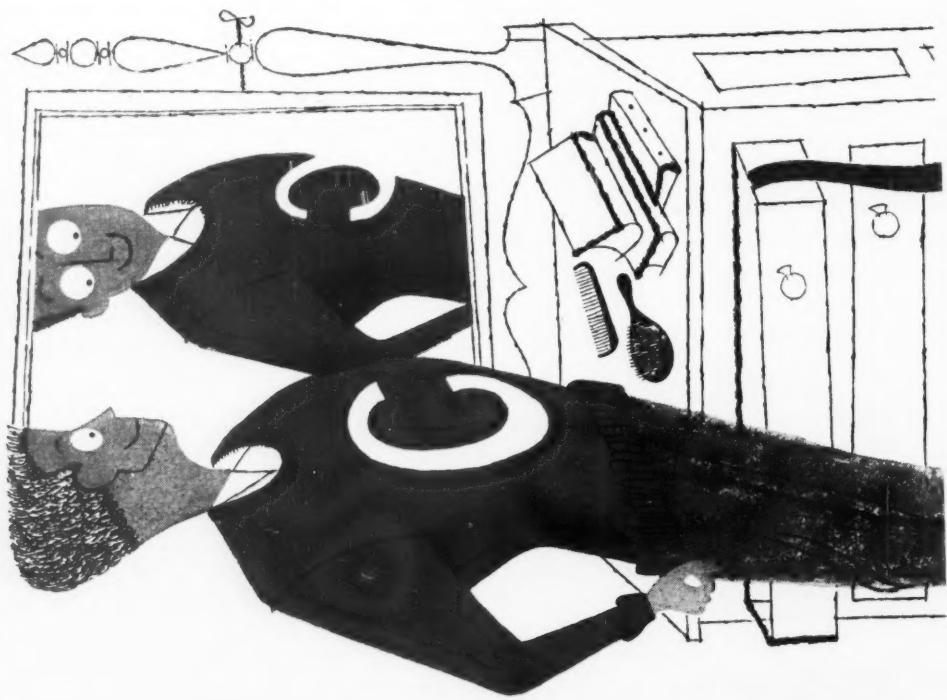
tool steel

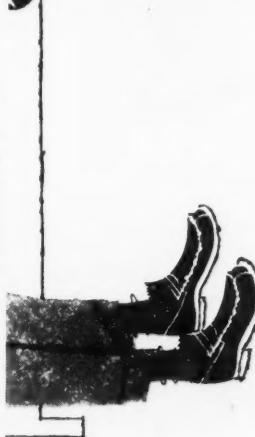
in

first letter

our

we won





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9" diameter.

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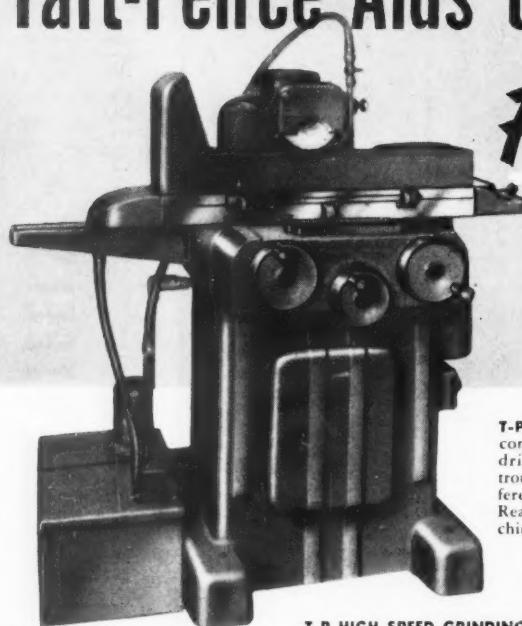
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TOOL STEELS

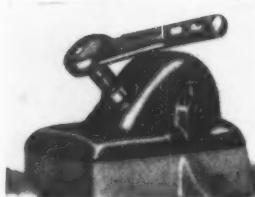
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Taft-Peirce Aids to Grinding

*Faster
Better
Easier*



T-P WET GRINDING ATTACHMENT
consists of coolant supply tank, motor driven pump, splash guards, drain trough, and wheel guard. Won't interfere with action of tilting wheelheads. Readily installed on machines in service.



T-P HIGH SPEED GRINDING ATTACHMENT
permits grinding small angles or slots with large wheel machine. Ball bearing spindle operates at 18,000 rpm. Clamps to main spindle quill. Accommodates wheels with $1\frac{1}{8}$ ", $3\frac{1}{16}$ ", and $\frac{3}{4}$ " shanks.

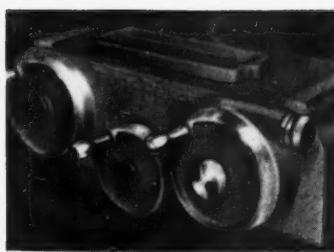
T-P SPINDLE TILTING ATTACHMENT
speeds accurate angular adjustments of spindle. Turns spindle block to any angle up to 30° . Readily installed on new or old machines.



T-P RISER BLOCK
for grinding work more than 12" high. Replaces column cap, provides bore for spindle quill. Increases grinding range of Taft-Peirce grinders to 24" in height.

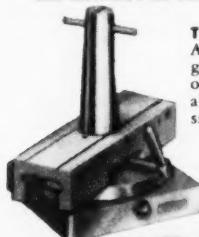


T-P INDEX GRINDING FIXTURE
divides work accurately for grinding flats, keyways, splines, and other spacing setups. Available with 12-tooth precision index plate, or special plates up to 24 teeth.



T-P VERNIER FINE-FEED ATTACHMENTS
make precision settings faster, easier. Read to .0001". Installed on either horizontal or vertical feeds on new or old model T-P Surface Grinders.

T-P GRINDING SPINDLES
give finer finishes and greater precision. Unique ball bearing construction minimizes end-thrust and radial-play . . . increase wheel-life and loading capacity. $\frac{1}{4}$ hp., 3600 rpm. motor is sealed and lubricated for life.



T-P ANGLE AND RADIUS WHEEL DRESSERS
Angle Wheel Dresser shown simplifies form-grinding of angles. Base is graduated 90° on either side of center. Radius Wheel Dresser, also available, for grinding contours with small surface grinders.

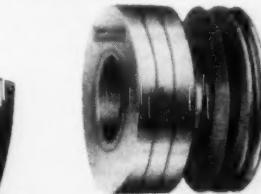
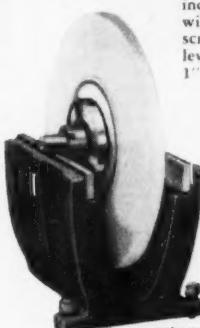
T-P NARROW WHEEL DRESSER
dresses to thinnest possible proportions safely and accurately. Graduated dial mounting permits precise adjustment of two diamond points. Useful for grinding narrow slots in form tools, gages, etc.



T-P SINE SETTING SLEEVE
is $2\frac{1}{2}$ " cylindrical sine bar. Fits over tapered end of wheel spindle in place of grinding wheel. Speeds accurate setting of tilting spindle.



T-P WHEEL BALANCING STAND
indicates balance of mounted wheels with great accuracy. Three leveling screws permit precise adjustment of leveling surfaces. For wheels up to 1" wide, 8" diameter.



T-P WHEEL BALANCING THIMBLE
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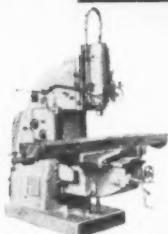
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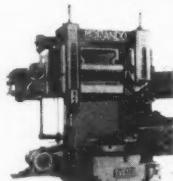
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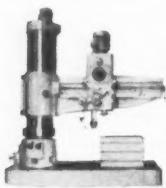
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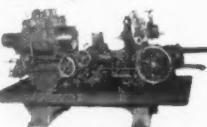
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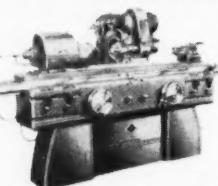
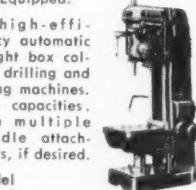


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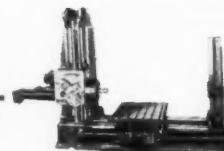


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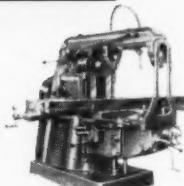
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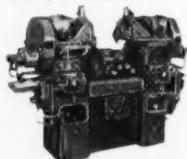
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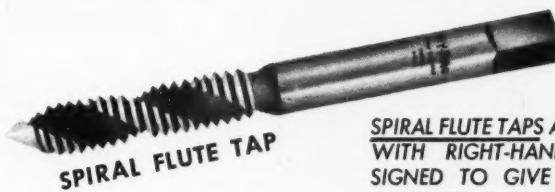
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Cancellations

AS reported in a recent issue of *MACHINE TOOL PROGRESS*, published by the National Machine Tool Builders' Association, cancellations of orders of machine tools for National Defense are still heavy, in proportion to new orders. In August of this year they equalled 14 per cent of new orders received. During the first eight months of this year cancellations were equivalent to 28 per cent of new orders.

The situation reflects the "step-forward, step-back" procedure which apparently has now become the pattern for the National Defense Program.

Machine tool cancellations have reflected in the main: (1) Machines originally ordered in excess of requirements and cancelled after a re-survey; (2) the "stretch-out" of the National Defense Program, which has put many projects farther forward in the future; (3) inability of Washington to decide definitely what to produce, and the sequence in which projects should be undertaken.

At the start of the defense program there was no question but that more machine tools were ordered than were required, for delivery earlier than was needed. This is typical of the early phases of the defense effort. The need for the re-survey of requirements which gave rise to the initial wave of cancellations is indicated by the fact that teams of men from the Metalworking Division of NPA call-

ing on 43 defense contractors found them holding 1500 machines which they did not need. These machines have since been reassigned.

Later cancellations are not so easily explainable. To what extent they are due to postponement, and to what extent to changing plans and objectives, is not readily apparent. It would appear, however, that there is continuing indecision and debate as to defense production objectives and sequence of urgency.

Some of the new orders currently being received presumably represent reinstatement of orders previously cancelled. Such orders never should have been cancelled in the first place. It is hard for machine tool builders to comprehend the reasons for such procedure, which precipitates re-scheduling and disposition of excess inventories. Such reshifting not only delays output but also imposes upon machine tool builders intangible costs above any possibility of recovery through contract cancellation clauses.

The machine tool industry itself employs directly only some 66,000 wage-earners. A large share of its defense output is achieved through subcontracting. Cancellations throw subcontract arrangements into confusion and thereby further upset production plans.

It is certainly to be hoped that defense projects and time tables will soon crystallize sufficiently to eliminate the running flow of cancellations.

5

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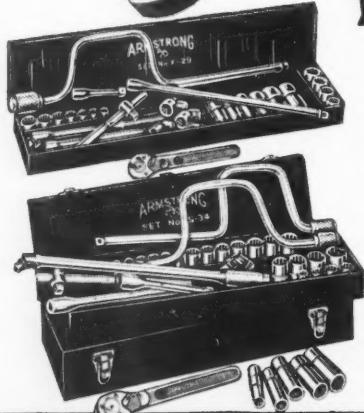
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**Vol. 25, No. 6
NOVEMBER, 1952**

MODERN Machine Shop

features
in this issue

Building Transmissions at Warner Gear

By Howard Campbell

Many of the special operations required in the manufacture of parts for automatic transmissions are described in this article. Particular emphasis is placed on the use of unusual machine tools. Page 118.

Weldments Find Favor in Tool Construction

By Fred W. Vogel

This article deals primarily with the increasing use of weldments in the construction of machine tools. A number of machine tools are shown in order to illustrate the wide variety of equipment in which weldments are now being successfully used. Page 128.

Shop Familiarization for Engineers Pays Dividends

By Gilbert C. Close

The shop familiarization course at Northrop Aircraft is designed to acquaint engineers with all manufacturing facilities, provide engineers with a visual conception of how designs are fabricated, acquaint both shop and engineering personnel with problems faced by both, and permit engineers to discuss their problems directly with shop personnel. Page 140.

Boring Mill Characteristics and Work, Part II

By John E. Hyler

In this article, the author discusses the features and operations of boring mill tables and attachments which permit broader use of boring mill equipment. Page 154.

Indexing Fixture for Milling Irregular Polygonal Shapes

By W. M. Halliday

The author describes a unique fixture which eliminated difficulties in machining workpieces of unusual shape. Page 178.

Modern Messenger Service

By Ervin McKnight

A description of a pneumatic tube system for dispatching messages, as well as light loads of various materials and parts throughout a large manufacturing plant. Page 192.

Analyzing Business Regulations

By Robley D. Stevens

A timely article dealing with unauthorized wage-salary boosts in the machine shop. Page 198.

Building Transmissions at Warner Gear

By HOWARD CAMPBELL
Editor Emeritus
Modern Machine Shop

Featuring some special operations required in the manufacture of parts for automatic transmissions.

POSSIBLY the two most important developments in the field of automotive mechanisms in recent years have been the overdrive and the automatic transmission. Of intricate de-

sign themselves, these units simplify the operation of the automobile and reduce the amount of maintenance required.

Among the foremost of the manufacturers who specialize in the manufacture of these units is the Warner Gear Company, whose three plants at Muncie, Indiana, cover thirty-eight acres. The equipment in these plants includes more than 5,000 machine tools and twenty-four heat treating furnaces. The combined plants employ approximately 5,500 people, with a payroll amount-

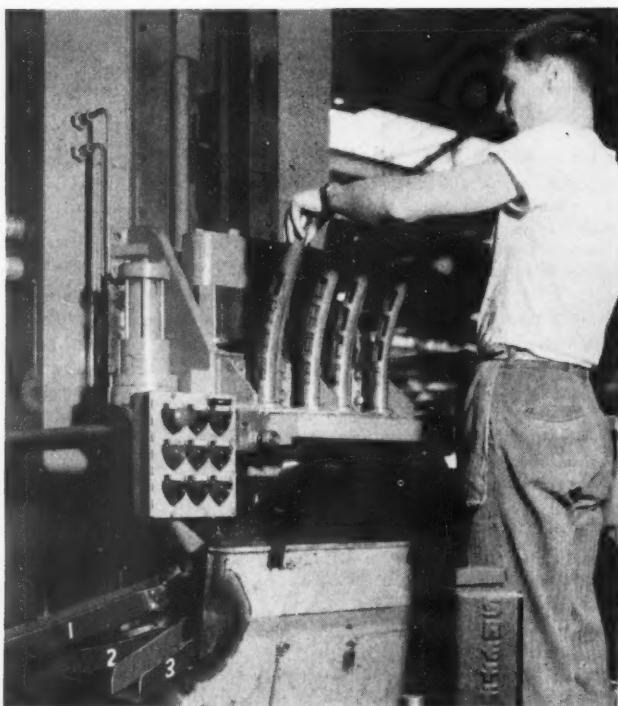


Fig. 1—Shaft holes in steel pinions are broached in this American broaching machine, using a Spirex broach.

Fig. 2—Pinions being pressed on arbors prior to operation on Cleveland hobbing machine.

ing to more than \$1,800,-
000 monthly.

To the automobile driver, the principal advantage of the automatic transmission consists in the elimination of a large part of the manual effort required to operate the car. This simplification is important, but it is obtained only at the cost of extra fine workmanship, unusually close limits of tolerance, and machine tools of the finest quality. Some of the operations required in the manufacture of parts for automatic transmissions are described in this article.

The mechanism of the automatic

transmission involves the use of steel pinions, both long and short, which slide on shafts to which they fit so closely that there is no perceptible "play" in the mating of the parts. To obtain this close fit, the holes in the pinions are drilled and reamed while they are being turned in a Cone auto-

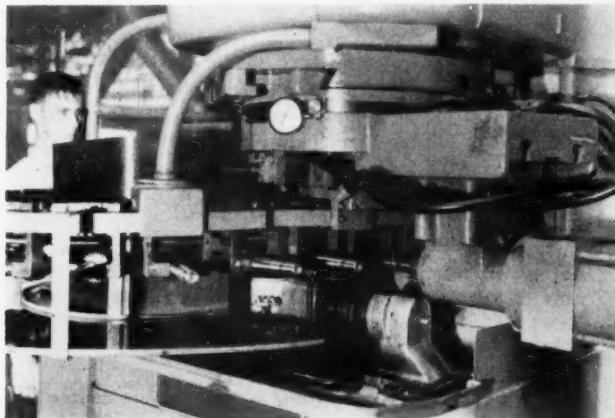


Fig. 3—The teeth on the reverse "sun" gear are finished by shaving in this Michigan Tool underpass gear finisher.

matic machine, then broached to size in the American broaching machine shown in operation in Fig. 1. Approximately 0.006 inch of stock is removed in the broaching operation.

Using a U. S. "Spirex" broach, the hole is broached within limits of 0.0005

inch in one pass. The machine is capable of 3,300 pieces per hour on this operation, which, incidentally, is faster than the operator can work. The pieces are fed to the broaching tools by hopper, which simplifies the task for the operator and also provides maximum safety.

As fast as the pinions are finished on the broaching operation, they are chucked in the Cleveland hobbing machine shown behind the operator, in illustration Fig. 2, where the teeth are cut. Designed with eight stations, the machine operates continuously, cutting the teeth on the long pinions at a rate of 650 pieces in eight hours or 950 of the short pinions in the same length of time.

The illustration Fig. 3 shows the operation of shaving the teeth on the reverse "sun" gear, for which operation a Michigan Tool underpass gear finisher is used. The work-pieces are fed to the finishing tool by means of a rotary table which has capacity for 45 pieces. Each piece is finished in one pass, 0.002 inch of stock being removed from each gear tooth. A tolerance of 0.0004 inch is the limit on this operation. The pieces are finished at a rate of 156 pieces per hour.

The spiral spline teeth on

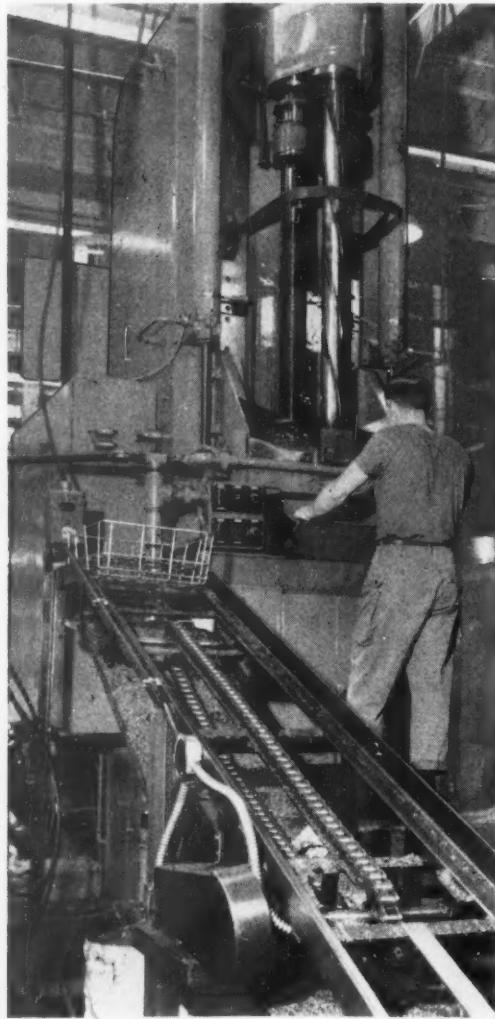


Fig 4—Broaching the internal teeth in the ring gear.



Fig. 5—Riveting a rear plate to a planetary carrier by spinning, for which a Leiland-Gifford drill head equipped with a carbide spinning tool is used.

en in the broaching operation, the first operation leaving 0.017 inch of stock to be removed in the finishing operation. Initially, the workpiece is held in position by means of a counterbored sliding tray until the broach enters the hole in the workpiece. Then the workpiece is held against the broach plate by the pressure of the broaching tools as it passes through the hole. The

the inside of the ring gears are finished by broaching in the dual-rail 30-ton American broaching machine shown in operation in Fig. 4. These gears are roughed out in a 4-spindle Cone automatic, then precision-bored and recessed in an Ex-Cell-O precision boring and turning machine. Two cuts are tak-

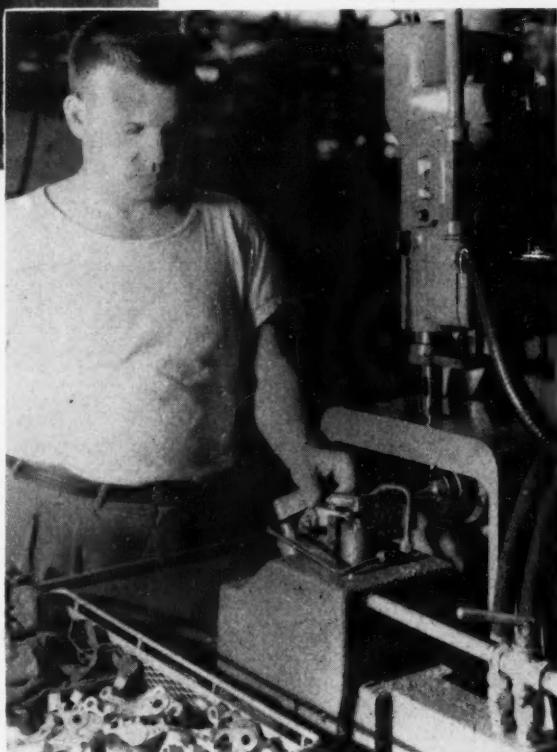


Fig. 6—Servo levers are drilled and tapped in this combination machine made of a Heald Bore-Matic drilling unit and a Hartford Special tapper.

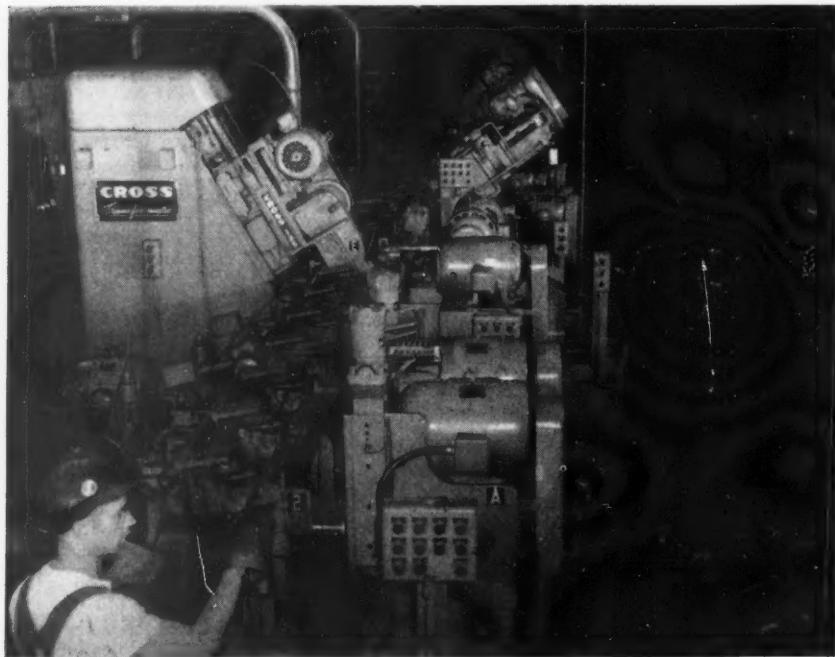
broach itself is a precision ground 70-inch-long tool designed to form the required spiral spline teeth inside the ring gear. This is a 66 involute spline with a 20 deg. right-hand helix angle. Production on this one broach is 144 pieces per hour, or the same number obtainable from approximately 28 conventional type gear cutting machines.

The machine shown in Fig. 4 is positioned so that the working level is located high above floor level. This positioning was required in order to provide adequate clearance for the long broach at the end of the stroke. It would be possible for the machine to be set in a pit in order to bring the operator to floor level but this was thought to be

unwise since the machine could not be moved to another location if necessity demanded it. The ramp at the front of the machine carries baskets of finished parts from the broach to the next operation. A motor driven chain in the center of the conveyor retards the speed of the basket of parts on its descent down the ramp.

The operation shown in process in Fig. 5 is a simple spin-riveting operation, but the efficiency of the operation equals the simplicity. In this operation the rear plate is riveted to the planetary carrier, using rivets cut from bar stock. The machine is a Leland-Gifford drill head, and the riveting tool is made of a short length of machine steel to

Fig. 7—This 92-foot machine performs 104 operations on the automatic transmission case automatically.



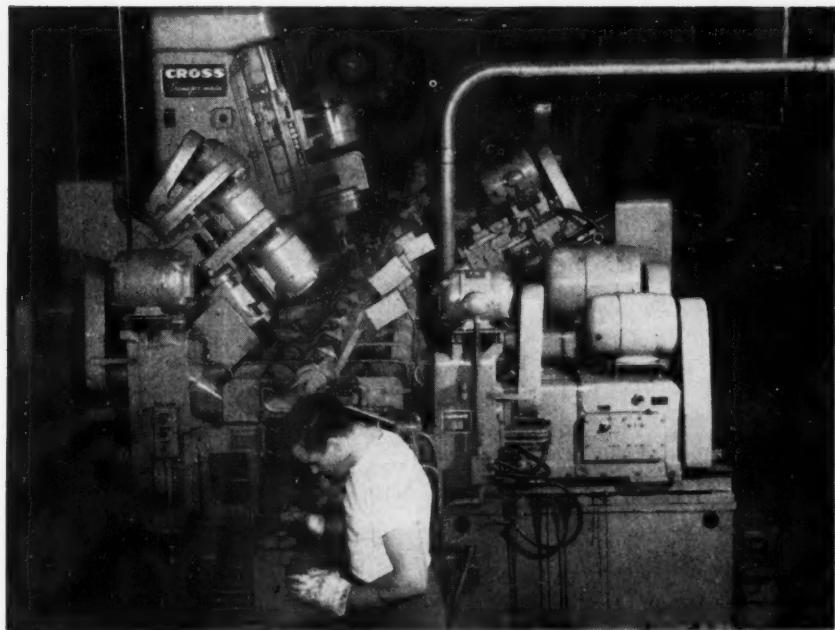


Fig. 8—Opposite end view of the 92-foot transfer machine line.

which a carbide tip has been welded. The workpiece is held in position by a foot-operated clamp, which applies pressure to a thick U-washer that bears against the shaft end of the pinion. Operating at a speed of 4,000 r.p.m., the tool spins the hollow end of the rivet flat and tight against the plate.

The interesting feature of the operation shown in process in Fig. 6 is the manner in which two units have been combined so that two operations can be performed in the time required for one. The fixture holds two pieces: one in position for drilling; the other in position for tapping. A Heald Bore-Matic drilling unit, set up in vertical position, is used for the drilling operation, and a Hartford Special tapper,

using a spiral-fluted tap, cuts the thread in the drilled hole. While the hole is being drilled in one piece, the previously drilled hole in another piece is being tapped. At the completion of the operation, the piece that has been tapped is removed from the jig, the drilled piece is positioned for tapping, and a new piece is positioned for drilling. The workpiece is a "servo" lever, made from a die casting.

The 92-foot-long transfer machine shown in Fig. 7 performs, automatically, 104 operations on the automatic transmission case. In the course of the operation the case passes through 54 stations, where it is loaded, drilled, milled, reamed, counterbored, tapped, inspected, and unloaded. The case is of cast iron.

Beginning with the first operation after loading, all the bearing holes are rough and semi-finish bored by the use of Heald Bore-Matics. The ends of the case are faced in the same operation. The case then passes to the second unit, where the pump pocket is rough bored and faced. In the next operation the pan face is rough milled, which is done with a Cincinnati horizontal milling machine. Two dowel holes are also drilled, reamed, and chamfered, which is done with a combination tool, then the pan face is finish-milled.

The ends of the case are rough milled with a Davis and Thompson Roto-Matic, then the case passes to the Cross Transfer-Matic, which drills, reams, taps and counterbores all holes in both

ends. At this point the case is indexed 180 degrees, which is done on the Cross machine, then all holes in both outside faces are drilled, reamed and tapped. The Cross machine also mills the regulator ledge. After all the other holes in the case have been drilled, reamed and tapped, the main bearing holes are finish bored.

Figure 8 shows the transfer line from the opposite end, with the operator examining one of the finished cases.

To insure that none of the tools in the machines at the 54 stations is permitted to continue in operation after it has become dull or worn, a system has been devised which insures that the machine will automatically be stopped when any tool has worn undersize. This system is based on the use of a board known as a "toolometer," shown in Fig. 9. Each working station is represented on the board by a duplicate tool and an explanation of the use of the tool, and each station is connected with the corresponding tool on the



Fig. 9—This toolometer board is connected with the machines on the transfer line, and is set for the number of pieces that each tool will run. The toolometer automatically stops the machine when any tool requires changing.

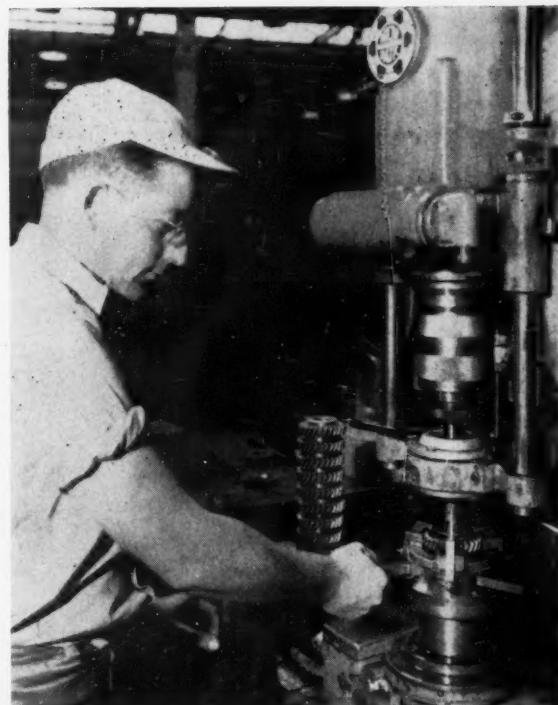
Fig. 10 — Spiral splines are honed in this Micromatic honing machine, a spiral guide being provided to guide the hone.

board. When a tool has processed the number of pieces that it has been set for, the machine at that station stops. A glance at the signals on the board will show immediately which machine has stopped, making it possible for the operator to change the tools and restart the machine.

The T86E-12 (main shaft low and reverse gear) is designed with a spiral spline which is rough and finish-broached before hardening, then honed, after hardening, to a sliding fit for the splined shaft to which it is assembled. The honing operation, shown in Fig. 10, is accomplished with a Micromatic honing machine that is equipped with a spiral hone and a spiral guide that provides the correct "lead" for the hone when it is in operation.

The workpiece is held in a fixture designed so that the piece is centralized by the clamping action, as shown. Approximately 0.0003 inch of stock is removed in this operation. By testing the spline at intervals with a hardened and honed spline gage, the operator is able to obtain a close sliding fit with desired amount of play.

The shaft holes in cluster gears are



also finished to size by honing in a Micromatic honing machine, as shown in Fig. 11. This machine is equipped with two spindles and a four-station fixture, making it possible to reload the two stations on one side of the fixture while the pieces on the other side are in process. Self-centering fixtures are used on this machine also, the pieces being locked in position by the use of fulcrum clamps. The shaft holes are honed to within 0.0005 inch of drawing specifications.

A perpetual inventory of maintenance tools and supplies is maintained, to eliminate the possibility of any suspension of production operations due to the lack of tools, machine parts, or



Fig. 11 — The shaft holes in cluster gears are honed to size in this double - spindle Micromatic honing machine.

precautions, under the supervision of the safety director. A well-trained staff, functioning in a centrally - located First Aid Department, is available 24 hours a day to render emergency treatment in cases of accident or sickness. Well-balanced meals are served to the employees at minimum cost in a modern well-equipped plant cafeteria.

supplies. This inventory consists of 6,800 machine parts of the various kinds needed for machine tool maintenance, 3,800 electrical machine and equipment parts, 1,900 plumbing items, and over 5,000 different types and kinds of tools. More than 5,800 shipments of supplies are received each month.

Working conditions are constantly being improved by the addition of modern equipment to eliminate manual labor as far as possible, and tested safety devices are installed wherever possible to safeguard the workers. Classes are held at regular intervals to acquaint supervisors and department heads with common-sense safety

Mechanics (Two Volumes: Part 1, Statics; Part 2, Dynamics). By J. L. Meriam. Published by John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y. Part 1, 340 pages; Part 2, 671 pages. Illustrated. Cloth binding, board covers. Price, \$4.00 each volume.

"Statics," the first of the two-volume set covering basic engineering mechanics, integrates the usual preengineering background of physics, mathematics, and graphics. The author progresses in easy stages from fundamentals to advanced theory, always emphasizing the importance of principles and problems which apply them. As a result, 672 practical problems, taken from many engineering fields,

serve to stimulate the reader's thinking powers. Answers are given for more than half of these problems, and 591 figures have been drawn to clarify these problems, each figure being keyed to the particular problem which it describes.

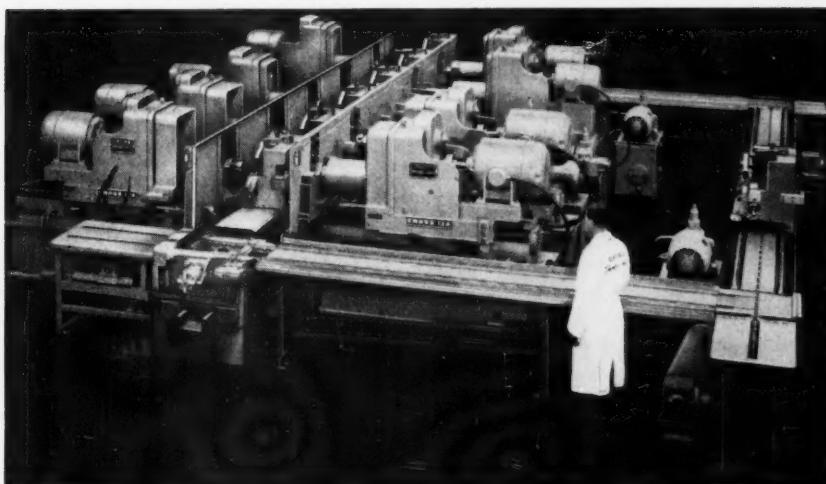
"Dynamics," the second part of the two-volume comprehensive treatment of the theory and application of "Mechanics," presents a large selection of problems which illustrate wide application to the various fields of engineering and which are designed to lead the student from the idealized and symbolic representation to the more practical, real, and interesting engineering situation. Full use of graphic

procedures has been made whenever they are of advantage. Each figure has been keyed to the particular problem which it describes.



Machine for Producing Tank Idler Arms

EQUIPPED with automatic transfer mechanisms for moving parts from station to station, the machine tool shown herewith was recently supplied by The Cross Co., Detroit 7, Mich., to a manufacturer for the purpose of producing tank idler arms. The machine is designed to finish $6\frac{1}{2}$ tank arms per hour. The material is cast iron with a Rockwell hardness of C-36. Operations include core drilling and reaming the small hole and hollow milling the boss around the small hole; rough and semi-finish boring the large hole and trepanning the groove on one end.



Weldments Find Favor in Tool Construction

By FRED W. VOGEL

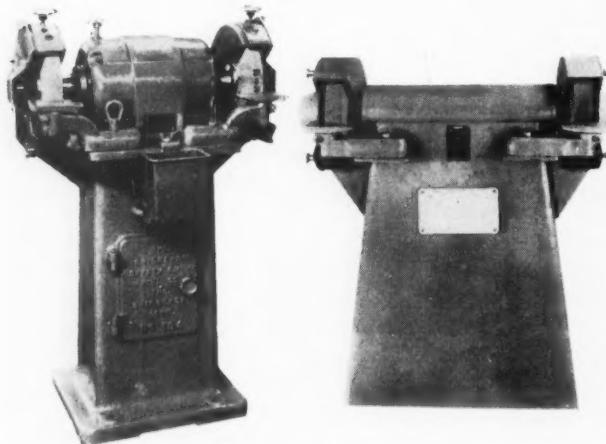
Ease of fabrication, less weight and cost, greater strength and toughness among desirable characteristics.

MODERN machine tools of almost every type have now been made of welded steel construction. The trend towards this material is significant and the following comments present the salient reasons why many designers select steel in preference to other materials.

Design

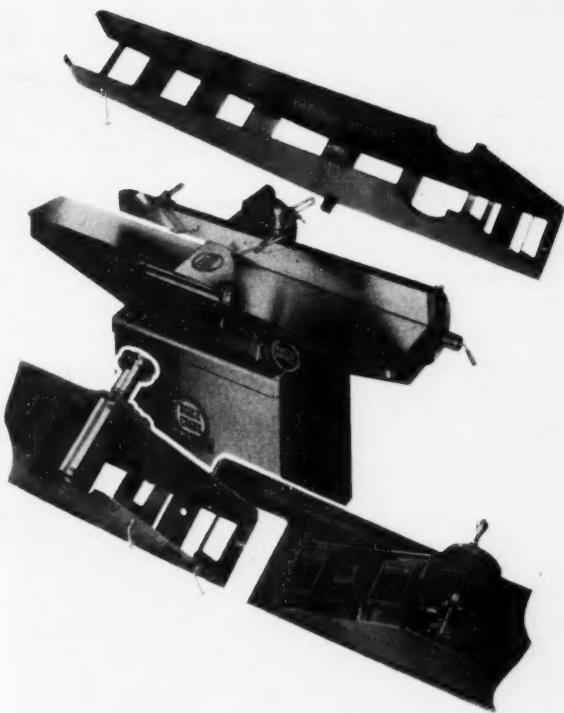
Rapidity with which design is translated into machine. Ease and rapidity of production is attained in weldments because they are commonly made from sheet, plate and standard sections. In

general, these are sheared or flame cut to specific size and shape and, if necessary, are quickly formed in a press brake. Arc welding usually is a short job, even when done by hand. If quantities are large, it often is facilitated by inexpensive fixtures and where automatic or semi-automatic equipment is employed, welding at speeds of 70 inches per minute and higher can be attained. Machining to close tolerances can be done prior to welding which can eliminate long and expensive machining on large unwieldy parts. Machining that may be done after welding is



Several improvements resulted in the redesign of the grinder shown at the left. By utilizing steel in the fabrication of the grinder, as shown in the view at the right, the rigidity was increased. By lowering the motor into the base, the stability of the machine was increased, and a streamlined appearance was obtained. A material weight savings of over 35 per cent in the base alone was achieved along with increased rigidity and stability. Machining operations in fabricating were minimized.

Illustration showing a new 8-inch jointer of entirely new design manufactured by the Boice Crane Company. This steel design has proved to be lighter, stiffer and sturdier than the previous cast iron design. The design permits higher initial and retained precision and is more economical to build. All machine components are weldments including all portions of the table, the fence, and the wrap-around base. A girder-like structure, as shown in the view above, forms most of the outfeed table. The top plate is welded to this structure to form an exceedingly rigid but light structure. Bearing seats are made of half circles, plug welded to the sides. The view below shows the front end of the outfeed table and the inverted mating position of the infeed table assembly showing the dovetail way and double gear that move the infeed table along the ways to adjust the depth of cut. It was estimated that a cast iron jointer comparable to that of the new design would weigh more than twice as much and would be subject to warpage and damage.



rapid because tolerances in welding can be held to close limits necessitating only very light cuts to give the finish required. Frequently, even in a new design, the weldment is ready for use the same day that the drawing reaches the weldery.

External shape and size can be suited to function readily. Although some designs cannot be duplicated as economically as weldments, duplication is not the aim of a good designer in selecting steel. His purpose is to achieve the performance of a given function with the most economical machine he can create. A weldment can be made whatever size or shape is called for by functional requirements, even to the

point of involving undercuts and curved reflex contours.

Flat surfaces and section thickness. Flat areas, large or small, often are used to advantage in weldments and the minimum limit on thickness is much below that possible with other materials. Flat areas, especially where large and thin, can be used where design requirements dictate. It is unnecessary to have sections any thicker than needed for functional requirements of strength and stiffness. This is one significant and important reason why weldments weigh less and cost less than equivalent designs using other materials.

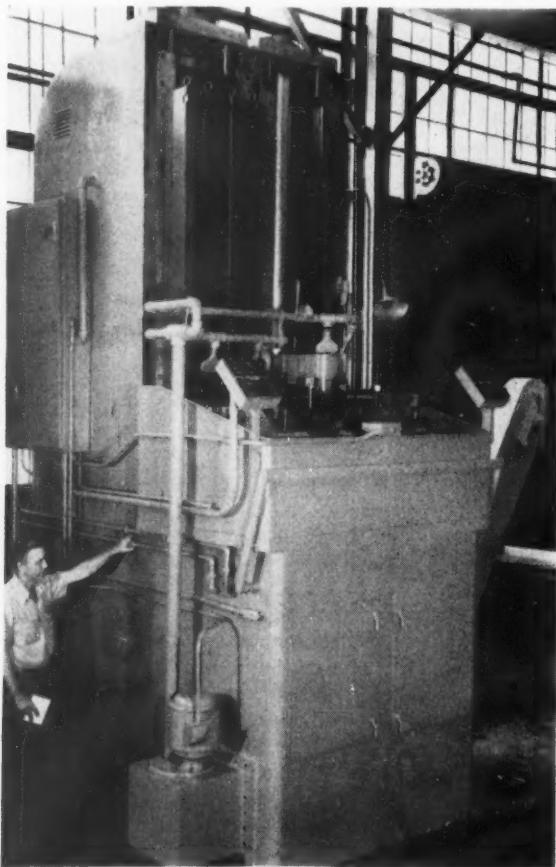
Rigidity is attained with economy in

metal. Material requirements and weight are therefore minimum. As the section modulus in steel used for weldments is comparatively high, it follows that, for a given section, steel is stiffer than other materials commonly used in machinery. For a required stiffness the weldment is lighter than an equivalent section in other materials with a lower section modulus. In other words, metal economy favors the weldment. It can be as thin as required for a given strength and stiffness. Moreover,

steel is tough and high in impact strength. Weldments can be used under heavy bending and shock stresses.

Stiffness can be greatly increased by ribs, flanges or corrugations, all of which are easily produced in weldments, either as integral parts or parts added by welding. A rib or stiffening element can be simply and quickly welded where required at a low cost. Furthermore, if after testing it is learned that additional stiffness is needed, it can be easily applied by increasing the size or number of stiffeners.

Shape and complexity. Weldments can have almost any shape and can be made in shapes that are not feasible in other materials. Although almost any degree of complexity can be attained, most weldments are simple structures composed of a few basic components that are easy to make. Complexity can be resolved by combining the



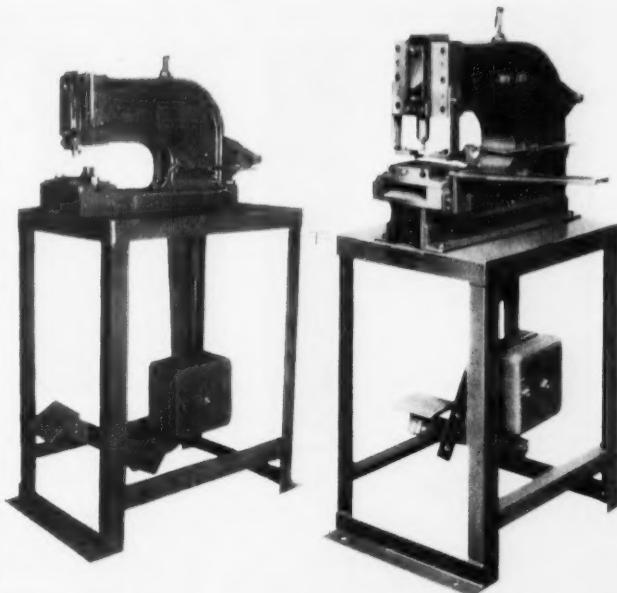
The large vertical broach shown here is a special machine manufactured by the American Broach and Machine Company for American Locomotive for use in broaching bearings. Its capacity is 40 tons; height, 15½ feet; weight, 34½ tons. Precision operation is, of course, a requirement of a broach, and American Broach and Machine Company uses weldments extensively because of the rigidity that can be built into the machine.

Showed at the left is an illustration of a kick press before it was redesigned. At the right is the welded design. This recently adopted method of construction enables Whitney Metal Tool Company to control production without excessive outlay in equipment or manufacturing space. Appearance is improved and strength increased. Whitney estimates that the use of weldments saves approximately $\frac{1}{3}$ on costs.

simple basic parts. Once joined the design becomes a one-piece design without joints. Steel is used in the very demanding and complex designs of high compression diesel engines, aircraft and marine engines.

Material uniformity. Weldments excel in soundness because they are made from metal that has tough fibrous structure free from flaws. This uniformity of good quality in steel permits the use of a low factor of safety as compared with other materials not enjoying this uniformity of soundness. Steel is usually specified for liquid or gas tight containers since steel is not porous and does not permit seepage.

Appearance. Steel permits design changes to be made readily as the dictates of taste in appearance change. It is significant that steel is used today for making hard items that depend largely on appearance for their sale; stoves, refrigerators, other appliances, automobiles and furniture. Designers realize that standard steel

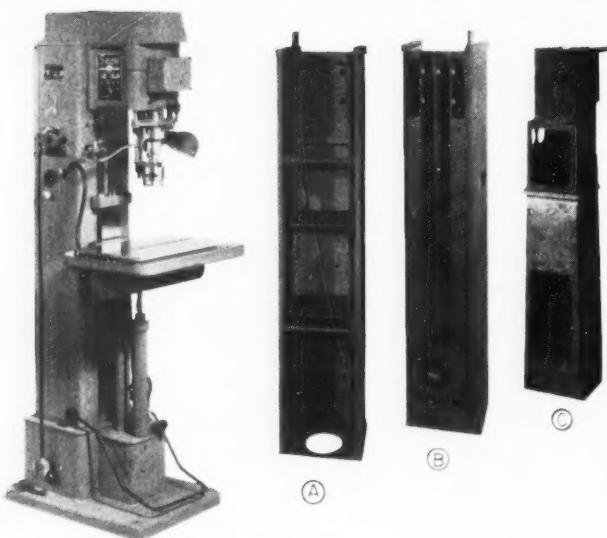


shapes can be readily transformed by shaping and welding into designs that appeal to modern tastes in appearance.

Production

In the final analysis cost will determine the material and process to be used in a design. Many factors contribute to the creation of costs and all factors must be examined critically to be sure cost analysis is honest and sound. Not infrequently the determining factor will be the ability provided by welding to completely control the elements of cost within one plant. Welding can be kept in step readily with other manufacturing operations and sales requirements. Steel fabricating encounters comparatively few delays beyond the control of the factory using it.

All costs must be estimated and al-



Views A and B illustrate a welded frame for the automatic drill and tapping machine shown at the left which is manufactured by Snow Manufacturing Company. The view marked C shows the original cast iron frame which weighed 180 pounds. B shows the outside view of the redesigned welded frame, and A shows the inside of the frame. The welded frame weighs 106 pounds for a saving of 41 per cent. The ways on the outside of the frame are plug welded to the inside and then rough ground. The ways are finished surface ground being held from within 0.00025 to 0.00003 inch throughout the entire height of the frame.

ternative designs prepared if production costs are out of line in any part of the design. Experience of machine tool builders has indicated that where this is done and correct weld designs are made, cost is always lower than that of designs for conventional materials.

Machining costs. The cost of making holes and recesses is low with weldments. Only holes that are needed for the functional requirements are made. Small holes may be punched or drilled. Larger holes can be burned or sheared and then generally require little or no machining. Recesses are produced by arranging plates, formed or flat, or other components, so that recesses result as a matter of course when the components are assembled. Long holes can be made by using tubes in the assembly.

The cost of over all machining is comparatively small, largely because initial dimensions are held close to size. In many cases, machining can be

completely eliminated by close limits on the basic cutting and forming operations of weldment components. Good welding fixtures can hold dimensions to the close limits of machine design during welding. In other cases where fixtures are not needed or practical, a sequence of welding can be worked out to hold close limits on finished dimensions. Where some machining is required subsequent to welding, the cuts are light and a minimum amount of metal is removed. In weldments of large size such as press bases, metal removal may be limited to as little as $1/16$ inch. Frequently, when large weldments are involved, machining can be done on the weldment components before assembly so that handling of the large weldment for machining is eliminated.

The uniform quality of steel makes for faster machining speeds. Manufacturers of carbide tools recommend speeds for steel which are considerably

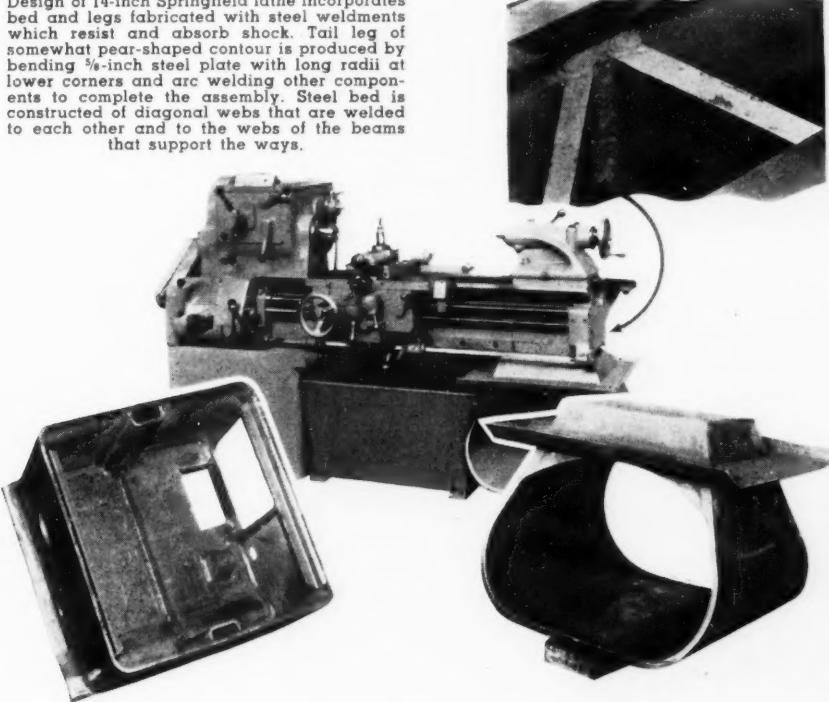
in excess of other commonly-used materials, and it is, of course, the tool which has been and always will be the critical item in removing metal. Modern machine tools are built with sufficient power to take full advantage of the higher machining speeds possible with steel fabrication. Speeds have been realized which remove 25 cubic inches of metal per minute at surface speeds of 1500 feet per minute and 0.010 inches per rev. feed.

Tooling Costs. The control of tooling costs is frequently a major consideration in selecting welded steel design. Costs can be controlled to match the economic requirements of the job. Tooling may range from simple jigs

Design of 14-inch Springfield lathe incorporates bed and legs fabricated with steel weldments which resist and absorb shock. Tail leg of somewhat pear-shaped contour is produced by bending $\frac{3}{8}$ -inch steel plate with long radii at lower corners and arc welding other components to complete the assembly. Steel bed is constructed of diagonal webs that are welded to each other and to the webs of the beams that support the ways.

to expensive stamping dies, and selection can be made to fit the needs of the job and according to what the job can pay for. Furthermore, design freedom is not surrendered to any fixed type of tooling. Design changes can be made in order to either reduce or increase tooling requirements as economy and/or quality may dictate.

A weldment can be produced by any one of a hundred different combinations of processes, all of which are available in a well tooled weldery. For example, depending on size, shape, quantity, accuracy required, and so on, a part may be hand flame cut, single machine cut, flame cut, multiple flame cut, stack flame cut, square sheared,



nibbled, jig sheared, hack-sawed, band-sawed, blanked, cold sawed, friction sawed, and so on. The right method for the given situation may be selected.

Temporary tooling can be quickly and economically made for new product development. Tooling can be changed easily to accommodate design modifications.

Welding reduces the amount of tooling required for machining operations since it reduces the amount of machining required. It simplifies machining tooling by permitting it to be done on smaller component elements before final assembly.

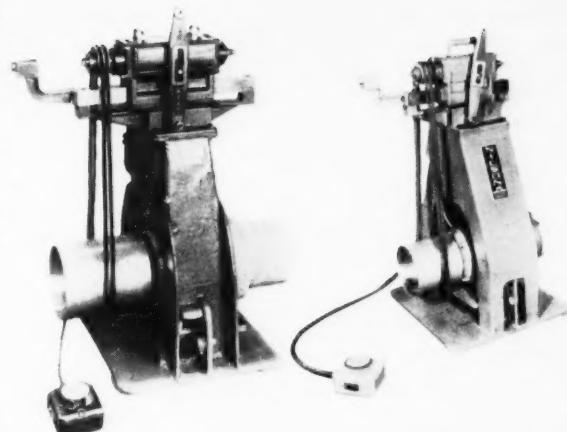
Indirect Costs. Here again, control of these costs is frequently a major factor in the decision to use welded steel. Plant investment required to perform welding operations and the operations necessary to prepare material for welding amounts to a relatively small cost which, when allocated as overhead cost, is a fraction of the total. Welding itself requires no elaborate metallurgical staff or development laboratory. The ratio of direct labor to indirect labor in welding operations is low compared to processes that require close engineering control. The labor supply is adequate both as to quantity and quality.

Production control cost is minimized since normally the weldment is produced in the user's plant. He stocks the raw material steel and controls his production according to its availability within his own plant. In other words, production control is a home problem. Expediting is confined to moving men and



A vertical and horizontal drilling machine manufactured and marketed by Snyder Tool and Engineering Company. The base of this particular machine is welded although the column is cast. Snyder does, however, use welded columns in other special machinery. Snyder finds that the use of weldments gives their designers flexibility in making special machinery. The company provides several standard bases and columns which can be readily extended or altered to accomplish the requirements of special machines.

View at left shows original design of a wire straightening machine manufactured by A. H. Nilson Company. At right is new welded design which offers greater rigidity than that found in the original construction. Machining costs are sharply reduced since the welded components are formed close to finished dimensions. Changes in design for special needs of customers may be accomplished without need for alterations in patterns.



material largely within the plant. There are no outside costs such as tooling maintenance and storage over which control is lost. Inventories are minimized and kept current with sales requirements.

Properties of Steel

The design and production advantages of steel stem from the inherent properties of steel. These are well known to users of steel but some of the properties of special significance to the designers using welded construction in machinery can bear repeating.

Steel costs less. Pound for pound the cost of steel is one-third that of iron. This means a 67 per cent saving in material costs to start with. How much of this initial advantage is realized in the final design is up to the designer in making maximum use of the material and in planning for economical production.

Steel is stronger. Steel has a 60,000 psi ultimate tensile strength as compared with the 25,000 psi ultimate tensile of run-of-foundry gray iron.

Steel is stiffer. Steel, contrary to some belief, is actually 2 to 3 times

stiffer than iron. A section in steel will deflect under a given load only half as much as will the same section in iron under the same load.

Because of steel's uniformity in quality and more dependable properties, a designer may work closer to known stresses. He can utilize safety factors as low as five for steel designs as compared with eight for the conventional gray iron.

Steel provides four times the resistance to fatigue that iron does and has the ability to withstand impact and absorb shock which are largely absent in ordinary gray iron.

With its advantages in properties and cost per pound, the engineer today has an initial cost advantage with steel of seven to one. Less material is needed to perform the same function. The right amount of the right material can be put exactly in the right places. With modern welding materials and methods, welding designs become one piece solid construction with uniform properties of strength and ductility. The solid homogeneous structure can be machined freely with

minimum metal removal involved. The structure will excell other types of design in fatigue and impact resistance.

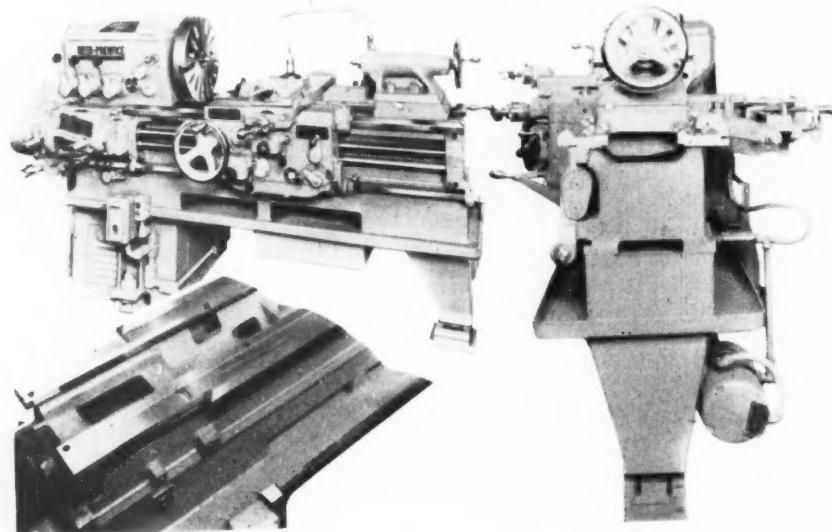
The design will also be more resistant to vibration than an iron design. The engineering problems of forced vibration are the same regardless of material used. The actual so-called dampening effect of a material is relatively infinitesimal in the presence of the large amount of mechanical energy produced per unit of time by the operating vibration of the machine. The material simply cannot absorb this energy by its dampening qualities or internal friction.

In the design of machinery, the basic problem is to reduce vibrational movement to a minimum. Maximum movement in a machine occurs when the frequency of the working vibration co-

incides with the natural frequency of the machine. This coincidence of natural frequency and working vibration produces maximum movement called resonance. Resonance must be avoided in all machinery since under resonance operation is impossible.

The best way to avoid resonance is to design the machine in such a way that it will have a natural frequency above the highest operating frequency. When using steel, an equally rigid or strong weldment automatically weighs at least 50 per cent less than the comparable cast iron design and, therefore, has a natural frequency 70 per cent higher than that of an equivalent casting. At working frequencies other than resonant frequency, equally rigid machines will have essentially the

Illustration showing sea-duty engine lathe manufactured by Reed-Prentice Corporation. The use of welded steel in the bed is said to provide rigidity greatly in excess of a comparable cast iron bed, and in the supporting members, absorbs and dissipates forces causing deflection. The bed design is an adaptation of the principle of the triangle; it is a welded unit of back and front walls connected by diagonal plates, reinforced by vertical cross plates.



The automatic conveyor type tapping machine shown here was developed to handle parts which do not lend themselves to dial feed due to the size and shape of the part. The machine carries the parts nested in plates which are mounted on an endless conveyor chain which is indexed from right to left carrying parts from spindle to spindle. At the left is shown the first redesign in which a weldment was used for the conveyor pan unit. Upper view shows the final design which is of all welded steel construction. The conveyor pan is of clean-cut functional design blended into the fabricated steel base and upper spindle slide. The machine operation was expanded to include tapping, drilling, threading and milling, all on one base.



same amount of movement regardless of the type of material used.

Welded Lathes for Sea Duty

Compensation for the lack of stationary and level foundations in operating precision machinery aboard battleships is of utmost importance. Also, such machinery must be "shock-proof" to withstand shocks as might be caused by gunfire, and yet it must

retain its accuracy and reliability. In the case of lathes, Reed-Prentice Corporation of Worcester, Massachusetts, provides the answer with an all-steel engine lathe of welded construction.

Construction of the bed is based on the triangle—the most rigid structural form attainable. Adaptation of this principle resolves itself into opposed, interlocking triangles. "I" beam shaped front and back walls connected by

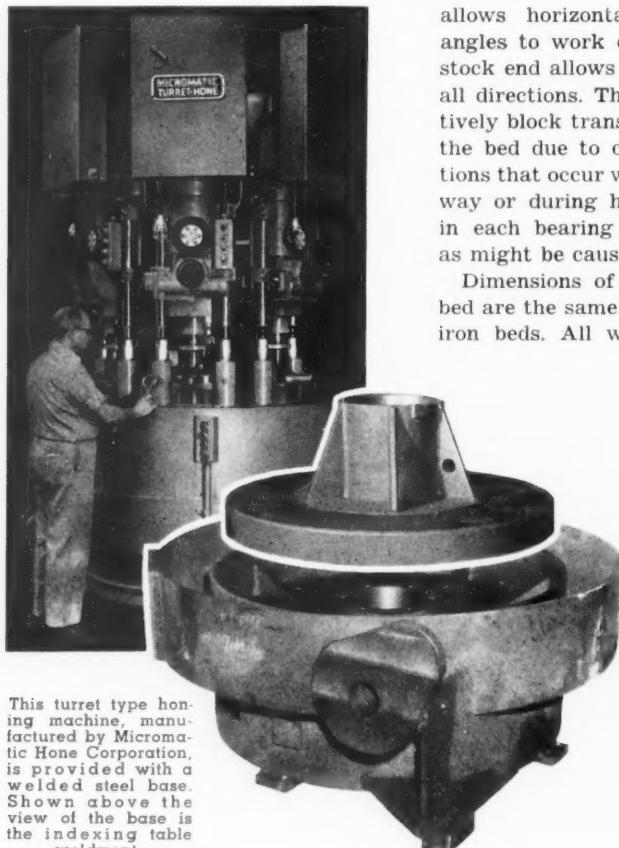
diagonal plates and reinforced by vertical cross plates all welded together make up the unit. After fabricating, the bed is normalized by heat treatment to remove residual stresses. Machining operations follow and hardened steel ways are then attached to insure permanent, dependable accuracy.

Absolute rigidity is theoretical, but the margin between the steel bed and ultimate rigidity is bridged by supporting the bed so that the forces causing deflections and strains are either

materially absorbed or dissipated.

Welded steel construction is used also in the supporting members. The bed rests on a full length base supported by welded steel legs which rest on three cushioned ball and socket bearings secured to a ship's deck. These supporting bearings have two functions in common, namely (a) to sustain weight of the lathe and (b) to anchor it in position regardless of whether a deck is plane or cambered. In addition, each has a third and individual function. The rear is a pivot; the front allows horizontal motion at right angles to work centers and the tailstock end allows horizontal motion in all directions. These provisions effectively block transmission of strains to the bed due to changing deck conditions that occur when a vessel is underway or during heavy seas. Cushions in each bearing absorb shocks such as might be caused by gunfire.

Dimensions of the fabricated steel bed are the same as conventional cast iron beds. All working mechanisms, such as headstocks, tailstock, apron and feedworks are therefore standard and renewable when worn or damaged. The first lathe of this type, after passing standard Naval inspection, was assigned to rigorous trials on work designed to test its output and accuracy. This proved successful from the



This turret type honing machine, manufactured by Micromatic Hone Corporation, is provided with a welded steel base. Shown above the view of the base is the indexing table weldment.

beginning. No foundation was prepared, no levelling attempted, nor anchoring in place, which demonstrated its adaptability to land as well as shop installations. Furthermore, the lathe can be relocated as frequently as may be required, and readied for productive work without delay.

Weldments for Honing Machines

When machines are required to hold finished dimensions within 0.0002 inch or closer limits, sturdy as well as stiff construction of bases or frames is essential. Among the machines manufactured by Micromatic Hone Corporation in which weldments are being effectively used is a turret type honing machine. A structure for this type of machine, built up from flat plates which are arc welded to strips that are rolled to form short cylinders, is exceedingly stiff and is designed to include thick and thin sections which can be combined in a way that would not be feasible in a casting.

Although units of similar shape could be built up from castings, walls

would have to be much thicker than for weldments and patterns would be expensive, making total costs much greater for the cast assembly without compensating benefits and no significant advantages.

Heads for honing machines doubtless could be designed as weldments, but the design of head shapes now in use is one better adapted to casting and castings serve well for this purpose. Such castings are moderate in size and irregular in shape and are readily cored out to accommodate mating parts.

In the machine here described as in other types of honing machines, the combination of weldments for large components and castings for some components of small size work out well, as each is well adapted to the functions it performs.

Editor's Note: The data and illustrations used in this article were made available through the courtesy of The Lincoln Electric Company, Cleveland, Ohio.

Cleaning Inside Diameter Threads

THIS arrangement of small brushes made by The Osborn Mfg. Co., Cleveland 14, Ohio, is used to clean inside diameter threads. Note that two operations are completed at the same time; the threads at two diameters are simultaneously brushed.



Shop Familiarization for Engineers Pays Dividends

By GILBERT C. CLOSE

In which the author tells how "educational" plant tours are planned and conducted at Northrop Aircraft.

IT is conservative to estimate that at least 50 per cent of the good ideas that originate in industry are never profitably employed. This is not due to any inherent weakness of the idea itself, but generally is caused by lack of proper planning and facilities for putting the idea into use. Thus the idea or plan loses its force, and any results

obtained are prone to be mediocre.

Officials at Northrop Aircraft, Inc., avoided this possibility when the plan was broached by members of the producibility engineering section to introduce a shop familiarization course for the engineering design group. The need for such a course was obvious. Unschooled in available shop facilities,

Here a group of "visiting" engineers are watching a huge mill in action. First-hand knowledge gained by such demonstrations has already proved its value. When the design engineers return to their drafting boards, they are more impressed with shop problems and how proper design can help solve many of them.



The philosophy behind the tours is contained in this "Basic Course Premise." It was carefully worked out before the tours began.

and unknowing of the difficulties of certain shop operations, the design engineers continued to specify operations and tolerances that not only over-taxed, but often exceeded the ability of the shop to accomplish. A comprehensive study of these "difficult to produce" parts by the producibility engineering group indicated that most of them could be vastly simplified in both design and tolerance requirements with no reflection on overall quality or strength. It was further evident that such simplification would facilitate shop production and minimize shop problems that were threatening to become a serious bottleneck.

In its inception, the idea was to get engineering design personnel acquainted with shop personnel so that they would assume the status of personalities to each other, thus facilitating interdepartmental cooperation. But as the plan was studied more carefully, other very obvious and pos-

BASIC COURSE PREMISE

The information regarding each equipment item and process should be directed toward capabilities and limitations rather than machine operation. Particular emphasis should be given the following data.

1. Capacity:

Maximum and/or minimum part size. Limitations as to length, width, thickness and height will be of interest.

2. Tolerances:

Careful coverage of the practical range of tolerances, emphasizing the desirability of standard rather than minimum values. Effort required in obtaining critical tolerances.

3. Materials:

The relative effects of various types materials (aluminum, steel, magnesium, etc.) and consideration of the range of conditions encountered.

4. Tooling:

Discussion of standard and special tools (or tooling), including relative costs and set-up requirements.

5. Production runs:

Economical production rate and runs, consideration of machine operation based on this factor.

6. Skill:

Operator training and experience requirements. Effects of skill on set-up and production rate. Influence of design complexities on skill requirements.

sible advantages began to appear.

In its final form, the shop familiarization course had the following goals as its aim: (1) To acquaint the design engineers with all manufacturing facilities and the limitations and most opportune uses of each; (2) To give the engineers a visual conception of how designs are fabricated, and how design elements can simplify or multiply fabrication problems; (3) To acquaint both shop and engineering personnel with problems faced by both, thus to foster respect between them; and (4) Creation in the design engi-

SHOP FAMILIARIZATION COURSE NO. 110

1st TOUR

Loft and template January 21, 22, 23 & 24, 1952

Wood shop

Plaster shop

Foundry

2nd TOUR

Sheet metal fabrication January 28, 29, 30 & 31

Extrusion forming

Heat treating

3rd TOUR

Machine shop February 4, 5, 6 & 7

4th TOUR

Tool and die shop February 11, 12, 13 & 14

Assembly jig fabrication

5th TOUR

Welding shop February 18, 19, 20 & 21

6th TOUR

Paint shop and metal processing February 25, 26, 27 & 28

Spotweld

Cable assembly

7th TOUR

Plumbing hydraulic March 3, 4, 5 & 6

Engine sub-assembly

Electrical

8th TOUR

Plastic shop March 10, 11, 12 & 13

9th TOUR

Final assembly March 17, 18, 19 & 20

Flashweld

10th MEETING

All (4) classes combined, dinner, discussion and distribution of diplomas March 26

Classes will be conducted from 6:00 P. M. to 8:00 P. M. on the dates noted.

Each class will consist of a ten minute familiarization lecture beginning at 6:00 P. M. in the Photographic Laboratory Conference Room followed by a tour through the departments as scheduled.

neers of a feel for shop problems, and to permit them to discuss these problems directly with shop personnel, thus establishing a precedent for future contacts to iron out problems as they occur.

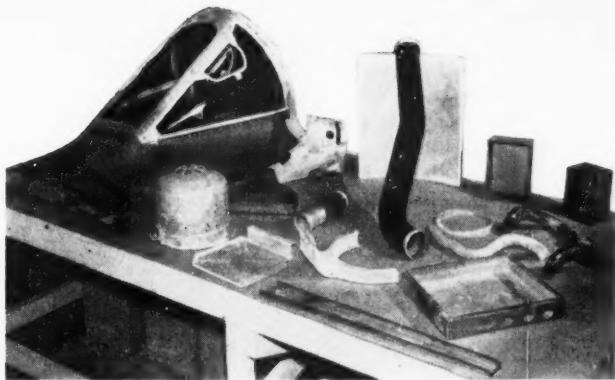
With these various aims, the overall concept of the plan boiled down into the idea of getting faster and more

Outline of tour schedule with tour subject and date of each.

efficient production through design simplification.

But the Northrop producibility group did not go off tangent to a logical course of action at this point. They did not immediately rush a large number of design engineers into the shop to mill around endlessly, ask aimless questions, and satisfy mere "bumps" of curiosity. Instead, more work was expended on pre-planning and pre-arranging a series of conducted tours than was expended on the original idea.

The first act was to establish as accurate-
ly as possible which shop departments would have a maximum effect on the design engineers in the interest of fostering simplicity. These departments were then correlated into a series of tour units. The next step was to develop a philosophy as to just what type of information should be imparted during the tours. With such



Display of specific parts produced in the metal fabrication shop. Such displays lead to pertinent questions regarding the shop production of each part, and how shop problems could be minimized by design simplification.

these machines that were obviously safe and that did not require extensive

a philosophy, all discussions could be conducted at a constructive level, and the familiarization course would not degenerate into a mere course on machine operation. To add a bit of showmanship at this point, and to provide excellent discussion material, it was decided to exhibit a display panel of parts as fabricated in the various shop sections.

To give each of the visiting engineers a better "feel" of actual shop operations, it was decided to let each man produce at least one part on many of the machines visited. For

set-up were chosen.

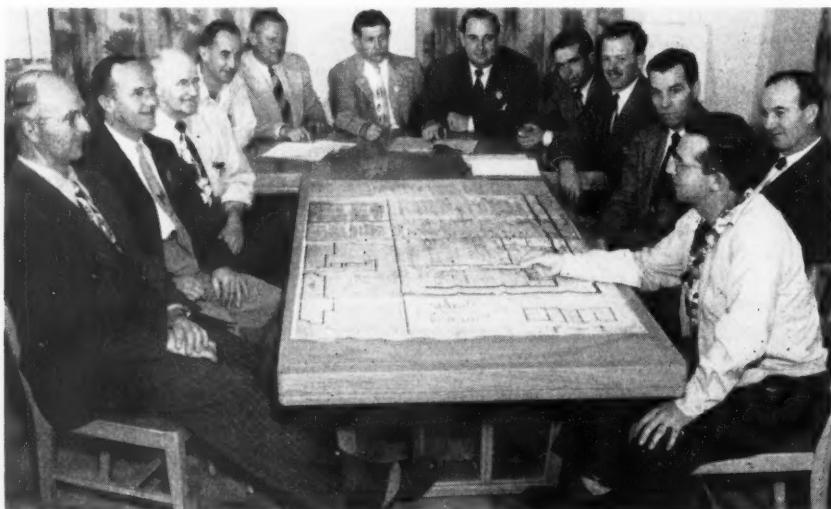
The second phase of the course pre-planning was to approach the shop divisions and gain their approval and support. It was obvious from the first



Here a design engineer actually produces a part on the drop hammer. Personal contact and personal awareness of shop problems by the design engineers are paying dividends at Northrop Aircraft, Inc.

that the shop would have to furnish the instructors and make local arrangements for the tours. "We were delighted at this opportunity," one shop supervisor points out. "We felt that the benefits of such a familiarization

each instructor in developing his special subject around the philosophy of design simplification so that the engineers could note immediately the effects of simplicity on the manufacturing operation. In the end, most instruc-



Tour captains from engineering and instructors from the shops meet to iron out details of a forthcoming tour. Such preparation made it possible to utilize tour time to the best advantage.

course would be threefold. First, we wanted the design engineers to become interested in shop problems. Secondly, we welcomed an opportunity to present our side of the picture to the engineers personally. And third, we felt that when the design engineers were intimately aware of various shop problems, this knowledge would reflect to our benefit when they returned to their drafting boards."

The shop departments were then asked to appoint a manufacturing co-ordinator with full authority to choose and train the departmental instructors for each tour. His duties were to aid

tors were chosen from the supervisory level, as these men had a better concept of overall shop operation and were better able to impart the information in an interesting and constructive manner.

Working together, the manufacturing co-ordinator and the instructors then prepared a general outline of each section of the course. It was further decided that tour captains chosen from engineering should be selected to aid the shop instructors and to keep all discussion pertinent to the problems at hand. Production design engineers were selected for this purpose due to

SEQUENCE AND DATA OUTLINE OF WELDING SHOP TOUR

Production order	Welding equipment
Engineering blue print	Electric arc machine
Detail instructions	High frequency arc machine
Materials (Parent metals commonly welded at Northrop)	Heliarc machine
Steel	Gas torch
Carbon alloy steels (chrome molybdenum)	Welding preparation
Low carbon steels	Metal surface
Corrosion resistant steel	Clean
Aluminum	Etch
Magnesium	Metal fitting—trim
Welding materials	Assembled detail parts
Steel	Welding jigs
Stainless steel	Clamp
Aluminum	Tack weld
Magnesium	Welding—specific type and application
Electrodes	Electric arc—Steel
Coated steel	Gas torch
Carbon	Steel
Tungsten	Aluminum
Gases	Heliarc
Acetylene	Corrosion resistant steel
Oxygen	Magnesium
Helium	High frequency arc—
Argon	Aluminum
Hydrogen	

Breakdown of subjects to be covered during tour of welding shop.

their intimate knowledge of both shop and design problems. These men then met with the shop instructors and the manufacturing co-ordinator to decide upon flow patterns, shop exhibits, and the machine setups for each shop department.

It was obvious from the start that several hundred engineers would be interested in the shop familiarization course. This made it necessary to limit "classes" to the number of engineers that could gather around a specific operation at one time. After much discussion, it was decided that 15 men per

tour would be the maximum number that could be efficiently handled. Also, by imposing this limitation on numbers, each man in the group would have time to ask pertinent questions in which he was particularly interested.

The final step of preparation proved very important in the long run. This was the preparation and use of a portable but powerful public address system which could be heard above the highest level of shop noises encountered during the tour. The instructor not only gave his talk through the micro-



This portable public address system made it possible for all to hear regardless of the prevailing noise level. Here an instructor is pointing to one of the 50 cal. machine guns mounted in the nose of Northrop's F-89 "Scorpion" all-weather interceptor airplane.

est to his group.

Tour schedules, including the date of each tour, were then made up and posted. Prior to the first tour the shop instructors, the engineering tour captains,

and the manufacturing co-ordinator conducted a "dry run" in a last-minute effort to iron out overlooked difficulties. To minimize interference with either production or engineering schedules, the tours were conducted on the second shift. Day shift men were used as instructors, and the engineering groups were primarily day-shift personnel.

This careful pre-planning paid huge dividends during actual presentation of the course and is now largely credited for the successful carrying out of the original idea. Presence of the engineering tour captains prevented prolonged discussion of details and side issues. Each tour captain made a ten minute talk prior to the beginning of each tour to point out pertinent problems to be studied, and how an understanding of these problems would aid in design simplification and subsequent production work.

phone, but questions and answers were spoken through the microphone, thus making certain that everyone in the group could hear. This kept offside discussions at a minimum which might have occurred when discussions that were inaudible to distant members of the group were going on.

Announcement of the shop familiarization course to engineering brought forth such enthusiastic response that any plans to place the course on a mandatory basis were immediately dropped. In fact, quotas for each engineering group had to be established, with selection of those to attend the course left up to the group supervisor. A final refinement was added at this point. The engineering supervisor was asked to select at least one man to accompany his group who had an abnormally large "bump" of curiosity. It was considered that such a man would lead the discussion and bring up many problems of particular inter-

Thus each group had a definite idea or "goal of understanding" when the tour started. Each tour was limited to two hours duration, as it was considered that longer time limits would invite fatigue with a consequent drop off of attention and practical results. The final tour session was followed by a dinner meeting at which top management reviewed the possible advantages of the familiarization course to the Northrop organization.

Now, only a few months after completion of the familiarization tours, Northrop production officials can definitely set forth the advantages that have accrued. The Productivity Engineering group note the following specific trends that are directly traceable to the shop visits and discussion:

1. There is a definite trend toward production economy in the attitude of the design engineers, markedly

evident by the open discussions on this problem during the original design of all shop-fabricated parts..

2. There is a noticeable improvement in cooperation between the shop and engineering. Both are more receptive to compromises that will aid the other. A personal rather than a detached attitude toward each other has been established.
3. The engineering group, as a whole, evidences the attitude that it, too, plays an important role in production, and that by proper design, it can vastly simplify and speed the various production processes.
4. The attitude of manufacturing and shop personnel toward engineering personnel has altered materially. They now assume a progressive rather than an aggressive manner in discussing problems wherein design



The foundry tour proved very interesting and enlightening to the design engineers. For the first time, many of them became personally aware of the limitations and advantages of foundry practices and techniques.

effects production efficiency. They are more willing to make certain concessions, secure in the knowledge that the engineers are following the same course of action.

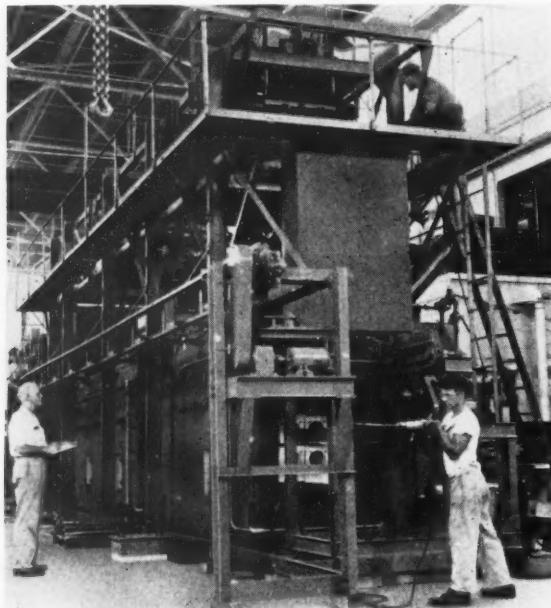
In fact, visible benefits from the plan are so great that future familiarization courses are being planned to keep engineers up to date on new shop developments, techniques and equipment. Northrop officials admit that such extensive planned training requires a substantial budget outlay, but admit just as quickly that the benefits realized have already more than offset the cost.

A final and very important advantage of the course was voiced by one top official. "By simplifying design we are speeding production, and higher

production speed is a direct counteraction for our current manpower problem. This advantage alone is worthy of serious consideration."



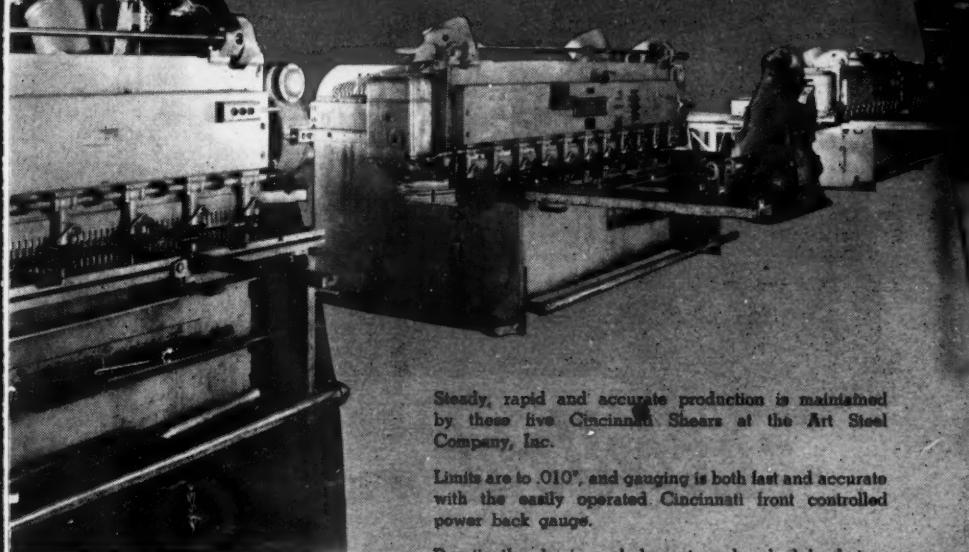
Gun Barrel Furnace



THE accompanying illustration shows a special automatic gun barrel hardening, quench and draw furnace being assembled in the large main bay of Plant No. 1 of the Lindberg Engineering Co., Chicago 12, Ill. The gun barrel furnace, including automatic loading devices, is 42 feet long x 10 feet wide x 19 feet high.

SHEARING 20,000,000 lbs. of steel

TAKES DEPENDABLE PERFORMANCE



Steady, rapid and accurate production is maintained by these five Cincinnati Shears at the Art Steel Company, Inc.

Limits are to .010", and gauging is both fast and accurate with the easily operated Cincinnati front controlled power back gauge.

Despite the day-in and day-out work schedule, knives are sharpened but once a year.

Investigate these accurate, dependable Cincinnati Shears—you will find them profitable in your shop. Remember, straight-edged square blanks, accurate to size, are produced at low cost on these modern Cincinnati Shears.

Write for Shear Catalog S-6.

Photos—
Courtesy the Art Steel Co., Inc.,
New York, N. Y.

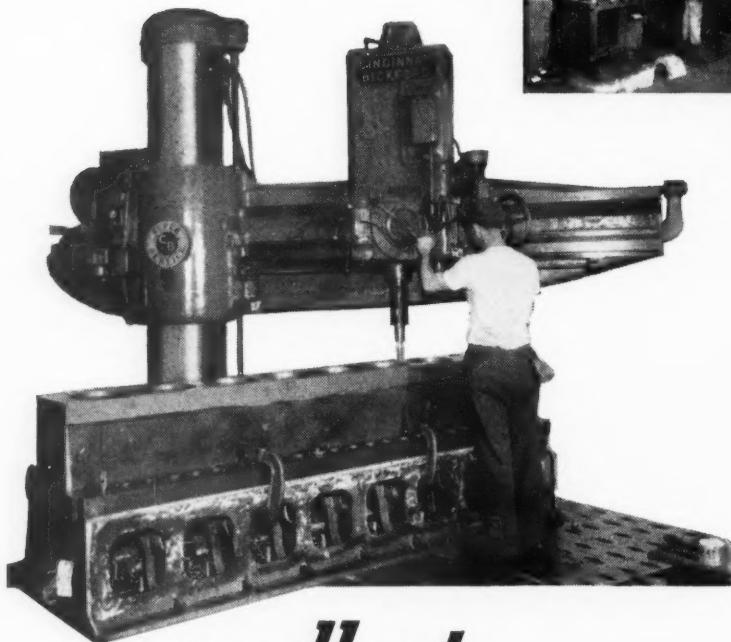
THE CINCINNATI SHAPER CO.

CINCINNATI 25, OHIO, U.S.A.

SHAPERS • SHEARS • BRAKES



This battery of Cincinnati Bickford Super Service Radial Drills is drilling, tapping and reaming smaller parts.



"excellent in all respects..."

The ease of handling, the performance, accuracy and speed of the 7' arm, 19" diameter column Cincinnati Bickford Super Service Radial Drills "rated excellent in all respects."

The job involved drilling, tapping, reaming of 43 holes in a large diesel cylinder block.

A battery of smaller Cincinnati Bickford Super Service Radial Drills is also giving "excellent" performance.

Write for descriptive circular of these fine machines.

CINCINNATI
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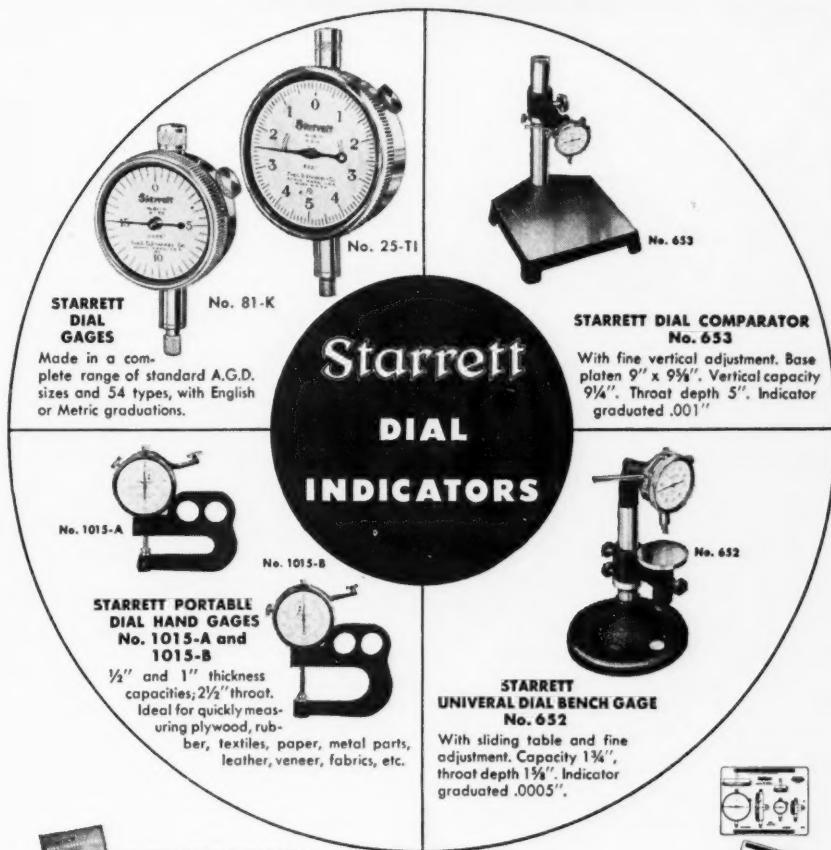


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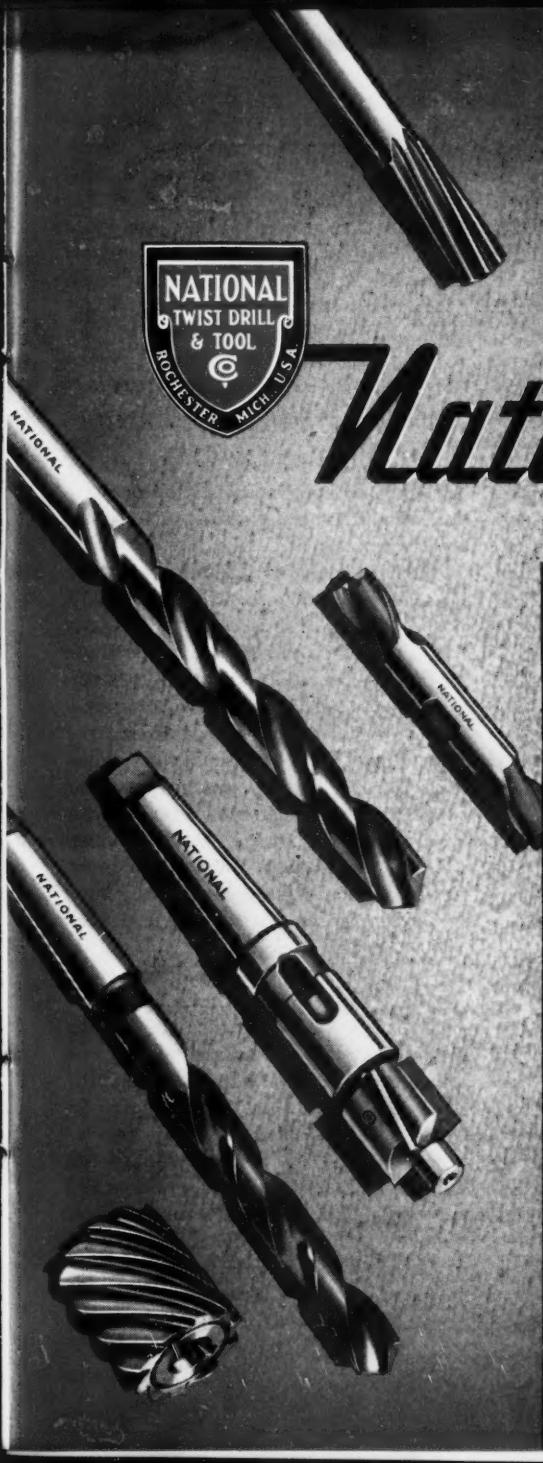
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Boring Mill Characteristics and Work, Part II

By JOHN E. HYLER

This article discusses the features and operation of boring mill tables and other boring mill attachments.

WHERE one is machining with carbides part of the time and using high speed steel tools at other times, the lower speed range of a boring mill table will be employed for high speed steel machining, while higher speed operation of the table will be required for carbides. However, tool feed is generally lighter with carbide tools than with high speed steel tools. Due to the application of adjustable voltage to the boring mill table drive, a higher efficiency is obtained than with the former countershaft drive.

The advantage of adjustable-voltage drive is particularly important where considerable facing work is being done, since an operator may increase or decrease the table speed continuously without stopping the table drive, depending on whether he is machining toward a smaller or greater diameter. This type drive is even more advantageous where finished cuts are involved, since stoppage of the table would leave a tool mark in the work. Where carbide-tipped tools are employed on facing work, stoppage of the table is also highly disadvantageous because shock of starting may result in tip breakage.

Where an adjustable-voltage drive

is in use, the operator is relieved of the job of climbing up a platform to shift gears mechanically. The rheostat through which table speed is controlled is governed from a pendant or portable push-button station that is always readily available to the operator. Usually, close control is available over inching for set-up purposes, including provision for inching the table in a reverse direction, if necessary. The rheostat dial may be so positioned as to be readable from practically any position an operator may take, thereby letting him know what his table speed is at any particular time and allowing him to pay closer attention to the actual machining operation.

The toolheads and rheostats on a boring mill have sometimes been connected together mechanically so as to change table speed progressively and automatically as the facing tool proceeds to greater or lesser depth. In some cases where boring mills are provided with turret heads, table speeds have been preset on individual rheostats for each position of the turret head. Thus, proper speeds are automatically selected as the turret is indexed into different positions. Based on these and other advantages, there is little doubt

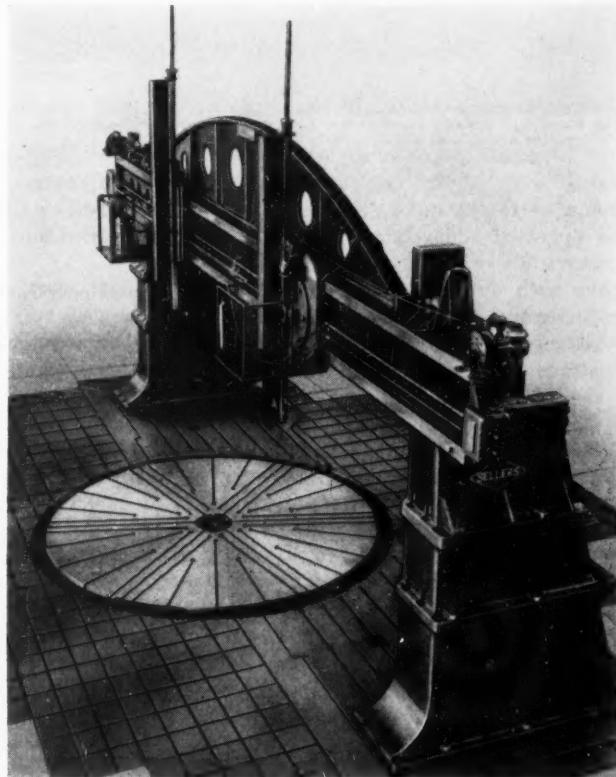
that the use of adjustable-voltage drives for boring mill tables will continue to increase.

Even gearshifting, as it applies to large ranges of table speeds on vertical boring and turning mills, is being divested of the degree of manual attention it formerly required. There is, for instance, a highly-efficient 12-foot vertical boring mill rather recently developed which incorporates an electro-hydraulic gearshift, actuated from the operator's pendant control. As the shifting signal proceeds from the pendant control, it energizes a solenoid which, in turn, actuates the hydraulic shift mechanism.

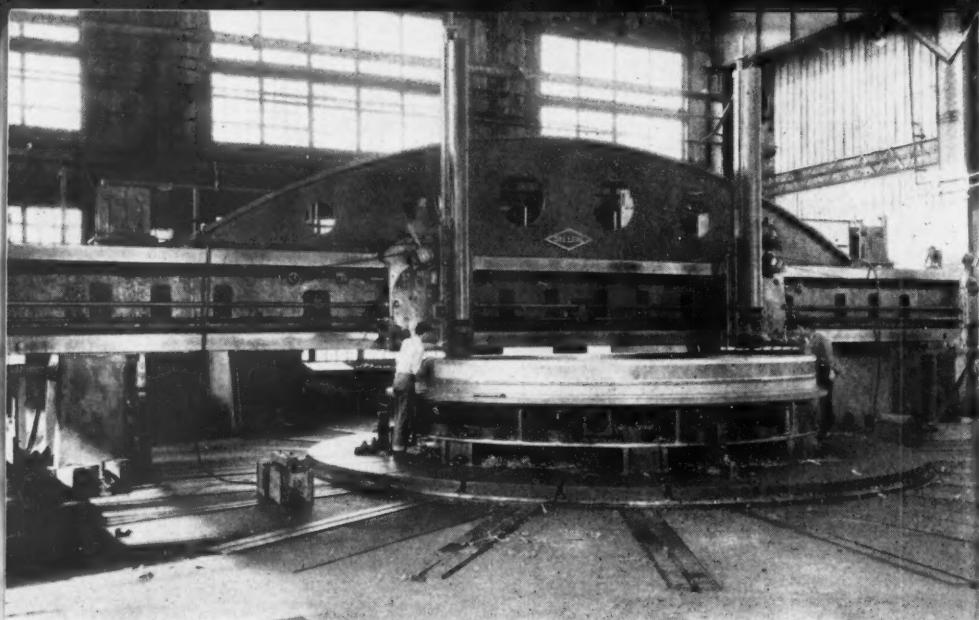
Thereupon, a clutch and gear train are actuated. This arrangement provides two ranges of table speed through an adjustable voltage drive and affords the operator easy control, allowing him to closely

watch the action of the cutting tools. Fully as interesting is the proposition of automatic gearshifting by means of gearshifter motors. After such a motor provides the required gearshifting impulse, it is then disconnected (whichever the direction of the shift) by incorporated limit switches.

Proper placement and holding of work on vertical boring tables is highly important. Chucks are often built into the table. Some machines can be equipped with self-centering tables, which are particularly efficient for series production of identical workpieces. These self-centering tables are pro-



View of a Sellers 42-foot boring mill on which both the cross-rail and the sectional uprights can be removed by a crane to allow huge workpieces to be set on the floor plates surrounding the table for boring and facing, while special tools with power feed are mounted on and revolved by the table. Illustration courtesy Consolidated Machine Tool Corporation.



Sellers 48-foot crossrail mounted on a 42-foot mill. The large workpiece in the process of being machined is a turbine head cover. Illustration courtesy Consolidated Machine Tool Corporation.

vided with three adjustable jaws, mounted on long table slides. Jaws can be operated independently; also together. Where chuck jaws on the table have both universal and independent adjustments, they can be used to advantage for holding round castings or castings irregular in contour.

Holding and Locating Work

Naturally, when round parts are being processed in series, such as large gear blanks or flywheels, the universal adjustment is employed, while independent adjustment is used for holding workpieces of irregular form. Often, it is necessary to clamp a piece of work to the boring mill table. Sometimes it is desired to hold a preliminarily-machined surface flat against the boring machine table to provide parallel facing accuracy. Often, special fixtures are employed to hold work in some

specific manner, especially where large runs of certain types of pieces are to be machined and the operation is repetitive.

Usually, work will be turned, bored, or both. All turned and bored pieces should be arranged so that the portion being machined is concentric with the table. A practice frequently followed in setting up work on the boring machine table consists of using a tool shank (which can readily be clamped in the toolhead) with a piece of heavy-gauge wire tack-welded to it so that the end of the wire extends several inches beyond the end of the shank. By setting and holding this device so that the end of the wire closely approaches the work on the table and then revolving the table slowly, the end of the wire may be used as an indicator, with the operator watching how close it approaches the work and

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Sentry 2Y electric furnaces at work in the
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Bridgewater, Mass.

"Hits The Nail On The Head At INDEPENDENT!"

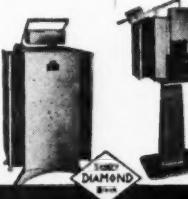
The two Sentry furnaces operating at the Bridgewater, Mass., plant of the Independent Nail & Packing Company are turning in top performance day after day.

Independent's "Stronghold" line of nails calls for quantity production of heading dies, threading and cutting tools made of high speed, high chrome-high carbon and carbon steel.

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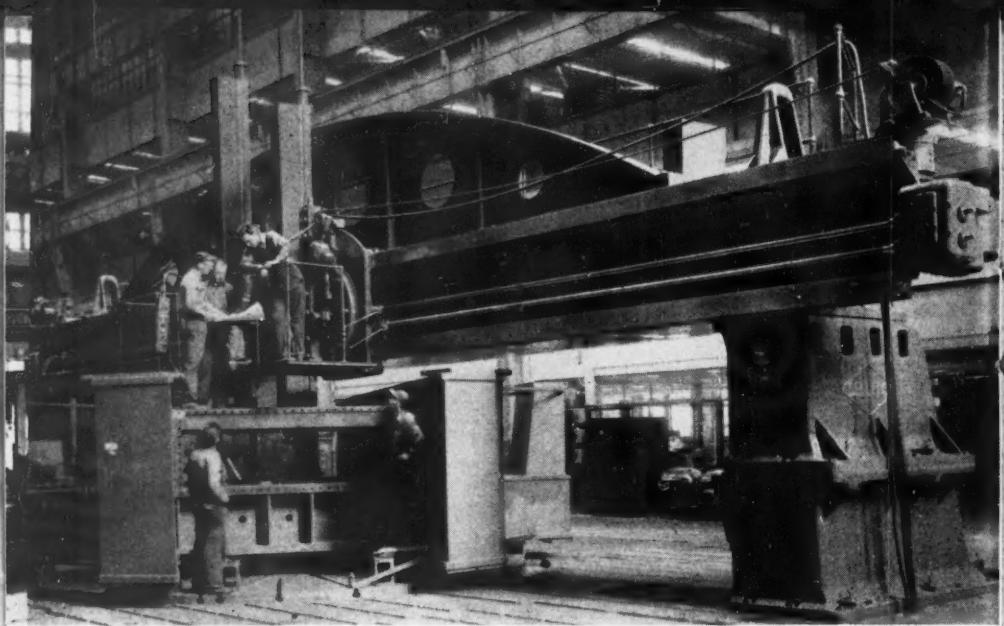


SENTRY MODEL 2Y
For small tools,
cutters of moly,
tungsten and co-
balt high speed
steels.



THE SENTRY COMPANY

BEDFORD MASSACHUSETTS



View of a 42-foot vertical boring mill being used in boring the lower bearing bracket of a water wheel generator. Illustration courtesy Consolidated Machine Tool Corporation and General Electric Company.

how far it recedes at different points.

This tool may be used for testing both concentricity of work mounting and uniformity of its height above the table. If by any chance work actually runs against the end of the wire, the wire simply flexes enough to let it pass. Nothing is harmed.

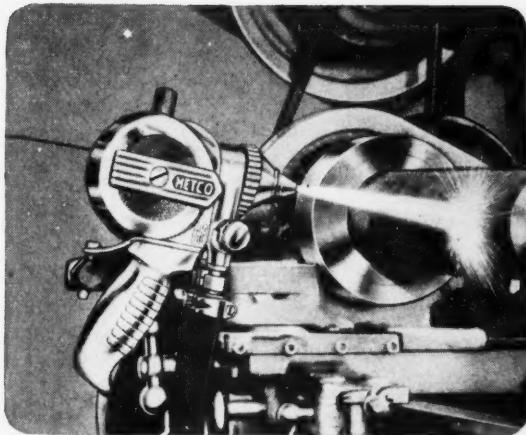
Tapers or Conical Cuts

Conventional boring mills usually provide facilities for swiveling the tool-slide to an angle from vertical so as to allow for turning a conical or tapered surface as the need may arise. Many machines provide for such swiveling of the tool ram by means of a worm-and-segment mechanism. There is a definite advantage to the use of such a mechanism for this purpose. A worm and segment will serve as a lock to prevent any tipping of the ram when

heads are unclamped for swiveling. Often, there is provision for swiveling tool rams to any point between vertical and 45 degrees removed therefrom on either side of a vertical line. Some vertical boring mills are provided with the power swiveling feature of tool spindles.

When the angle of a taper or conical surface to be machined falls in the range between horizontal and 45 degrees removed therefrom, it cannot be machined simply by swiveling the tool-slide. In some cases, a required taper falling within this range may be machined by using horizontal and vertical feeding movements simultaneously. However, special taper turning attachments are made available for some boring mills.

One highly efficient boring mill, fitted with two swiveling crossrail heads



**now
a really
low-cost
metallizing
installation...
with the new
Metco L-Gun**



Metallizing damaged journals on turbine shaft



Building up worn brake-drum



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New, low, compressed-air requirements ... only 10 cfm at 40 to 60 psi, already available in many shops, or supplied by inexpensive 3 hp compressor ... bring metallizing within reach of the small user.

Here's a chance for the smaller maintenance shop to get into profitable metallizing operations like these:

- Save up to 90% of replacement costs on machine repair jobs,
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- Apply long-wearing corrosion-resistant coatings to exterior plant structures, tanks and other equipment.

Sprays 23 Different Metallizing Wires — With the new L-Gun you can spray .10, .25, .30 carbon steels, stainless; babbitts, brass, bronze, nickel, aluminum, tin, zinc; special hard-facing materials such as Metco-Weld H, and the new self-bonding Sprabond wire.

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sacrifice in Metco quality. It embodies new developments in turbine and nozzle construction—is built, like all Metco guns, for rugged, dependable service.

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Free Bulletin or Shop Demonstration— Send off the coupon for the detailed information Bulletin 55 gives you. Or, better still, ask for a demonstration in your own shop by a Metco Field Engineer. He'll be glad to show you how the new Metco L-Gun works on some job of your own. No obligation, of course.



The following names are the property of Metallizing Engineering Co., Inc.

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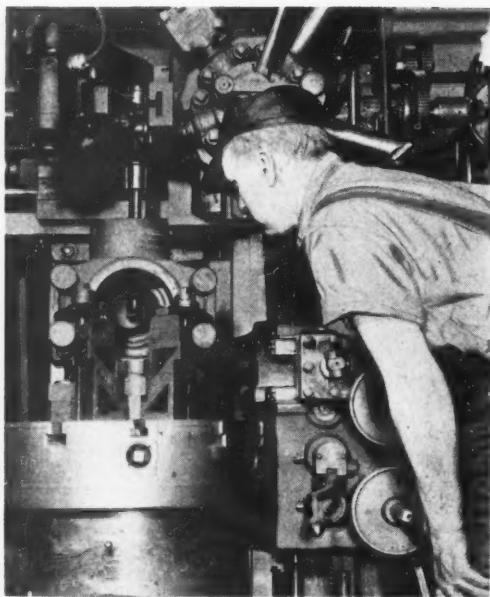
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In this illustration, a deep internal grinding operation is shown being performed on a Bullard vertical boring mill. The workpiece is a stainless steel extruding cylinder. A Dumore grinder, equipped with a quill designed for deep internal grinding, is mounted in a T-slotted block at one of the stations in the mill ram turret, which also holds a number of boring tools used on the job. Thus, the cylinder can be bored and ground in the same setup on the boring mill table. Illustration courtesy The Dumore Company.

crossrail, and are so made that their T-slotted front edges are positioned at such a distance from the crossrail as will serve to hold the slotted guide in proper relative position to the toolhead. Since the slotted guide may be set at any desired angle on the front edges of the brackets, it is apparent that the device

may be readily set up for turning any taper within its range.

This rail head taper attachment has a capacity for turning tapers horizontally to a maximum length of 25 inches and at a maximum angle of 15 degrees above or below horizontal. A side head taper attachment may be applied to the same machine when desired. The side head, when equipped with a vertical taper turning attachment, can be made to turn tapers vertically to a maximum length of 15 inches and at a maximum angle of 20 degrees either side of vertical.

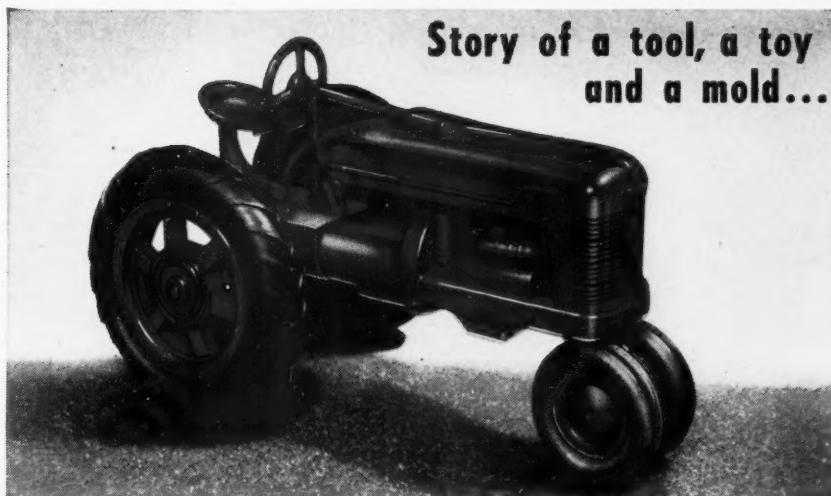
Some interesting vertical turning and boring mills of the type incorporating a turret on the single crossrail toolhead may be fitted with a taper turning attachment for the crossrail slide, which will machine tapered faces having angles of inclination anywhere between 3 and 45 degrees from hori-

and a right-hand side head, may be provided with a rail head taper attachment for the right-hand head. The arrangement involves provision of a protruding stud on the front of the toolhead and anchoring of a massive guide bar having a slot located at the same angle as is desired on the work taper. The stud on the front of the toolhead fits through the slot in the tapering guide. As the toolhead is traversed along the crossrail, the ram is forced to raise or lower due to the travel of the stud in the guiding slot.

How Guide Bar Is Mounted

The heavy slotted taper guide bar is provided with a bolt hole at one end and a bolt slot at the other which allow it to be bolted tightly to the T-slotted front edges of a pair of heavy brackets. These heavy T-slotted brackets are fastened rigidly to the machine

**Story of a tool, a toy
and a mold...**



Photos and data courtesy of: Product Miniature Co., Inc., Milwaukee, Wisconsin

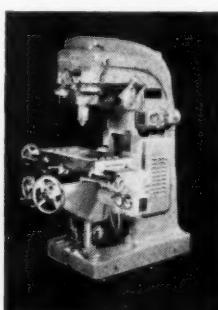
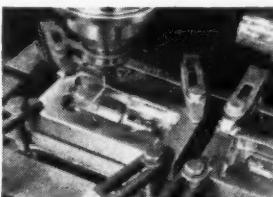
...another complex mold milling problem solved by the Rotary Head method

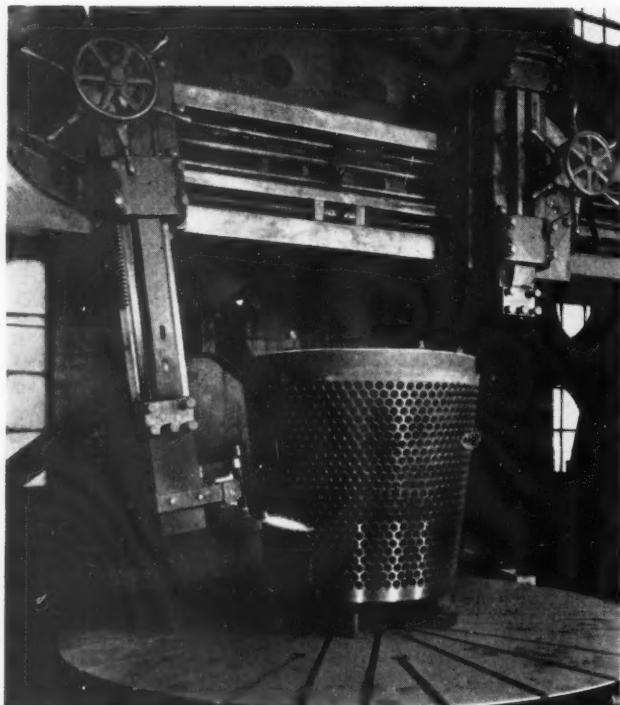
NO TICE the fineness of detail on this scale model! A Kearney & Trecker-Milwaukee Model 2D Rotary Head Milling Machine reproduced those details in the mold. No models or templates were used — the operator worked direct from blueprints. Workpiece material was oil-hardening tool steel.

Work was done from exact scale reductions of the real tractor assembly prints — with only minor details eliminated. There were no delays in beginning, no extra operations. Blueprint dimensions were transmitted directly into metal and

fine accuracy was possible because precise control of all operations is built right into the machine.

This exceptionally versatile machine can reproduce geometric shapes in both horizontal and vertical planes. If you have an unusual production problem, it will pay you to investigate the Model 2D Rotary Head Milling Machine. Write for Bulletin D-20, Kearney & Trecker Corp., Milwaukee, 14, Wisconsin.





This illustration shows an efficient setup for grinding a high finish on the perforated tapered surface of a 43-inch cast iron strainer core. The core is mounted on the table of a 16-foot boring mill, and a Dumore grinder is fastened to the boring mill ram. Illustration courtesy The Dumore Company.

zontal. The attachment used in this case enables tapers to be produced by application of change gears. The tool-slide is arranged to receive its vertical feed motion through a change gear which is located at the end of the cross-rail and is operated by means of the horizontal feed of the crossrail slide. In order to manage with a few change gears, tabulated data are supplied with this machine which show approximate tapering values. Intermediate values can be obtained by swiveling the tool-slide.

Radius-Link Actions Provide Curved Surfaces

It is possible, by using a swinging radius link, to control the motion of a

boring mill tool-head so as to produce cuts of uniformly curved type, provided the radius involved is relatively large. Radius links have, in some cases, been incorporated, for instance, in attachments used on a vertical boring mill for

turning crowned faces on steel pulleys. Different particular arrangements are possible. The tool in practically any case is held in a sliding holder in such a manner as to enable it to be slid back and forth by the action of the radius link.

Other attachments are quite often employed on vertical boring mills. A vertical boring mill is sometimes provided with one of its rail heads arranged for thread cutting. One heavy-duty boring mill, carrying two toolheads on the crossrail, is often furnished with the right-hand rail head arranged for thread cutting. Leads of four, eight, and sixteen threads per inch can be cut without using additional gears. However, other leads (in-

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THE *Hamilton* SUPER-SENSITIVE SMALL HOLE TAPPING MACHINE IS SUCH A TOOL!

The complete story of this machine
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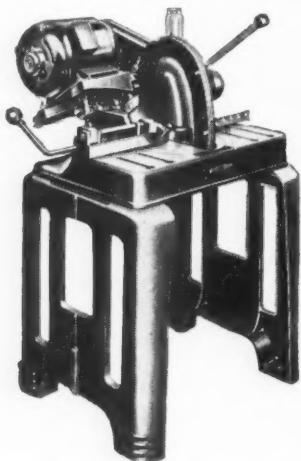
IT'S FREE.
ASK FOR IT!



cluding any desired from 2 to 24 threads per inch) can be cut by using additional change gears. Change gears are applied to shafts at the right-hand end of the crossrail. No changes in feed mechanism are necessary.

Different boring mills of conventional crossrail type, carrying two toolheads on the rail, may be provided with a right-hand side head if desired, although this side head is con-

sidered extra equipment. Some boring mills have a special fine feed attachment applied to them. This attachment is driven by a separate motor and attaches to the back of the boring mill frame. By its use, feeds from 0.003 to $\frac{1}{2}$ inch (or from 0.006 to 1 inch) are available. Coolant outfits particularly designed for use with given boring mills have nozzles attached to the rams in such a manner that the coolant follows the tool.



**Cut steel,
aluminum,
copper, brass
IN ONE FAST,
EASY MOTION**
with a
DELTA
Cut-Off
MACHINE

This new Delta machine paves the way for big production savings in your plant. It's easily changed from a non-ferrous to a ferrous cut-off machine by switching from steel blade to abrasive wheel.

Smooth, clean cuts through steel by the abrasive wheel keep burrs to a minimum—frequently eliminate deburring. Cuts through brass, copper and aluminum—by the steel blade—are made with "polished smoothness". It has hundreds of uses, such as cutting non-ferrous rod and tubing, old drills, mouldings, pipe and conduit, tool steel, steel tubing, rods and wire rope.

There is nothing else like this machine on the market, in its low price range. Send for Delta AB-51 catalog for full specifications.

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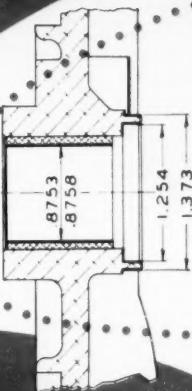
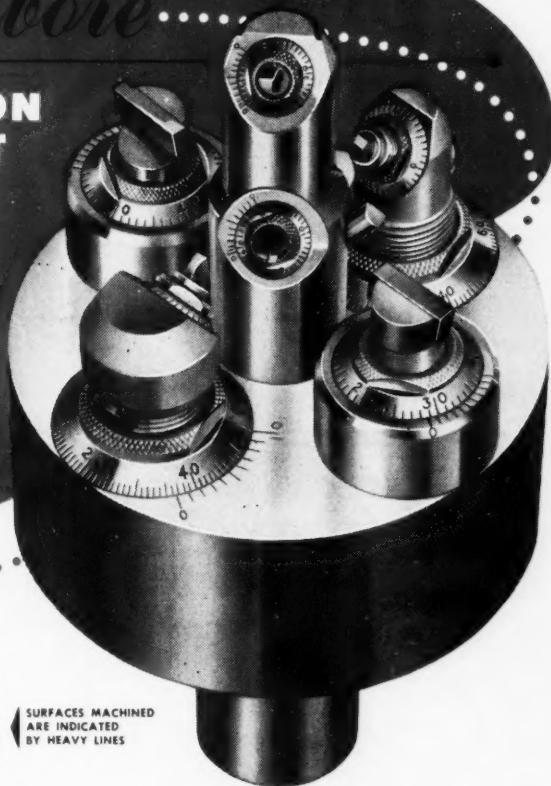
DELTA POWER TOOL DIVISION
Rockwell MANUFACTURING
606M North Lexington Ave., Pittsburgh 8, Pa.

Often, where multiple tooling is used on a cross-rail turret of a vertical boring mill in mass production, it has been found

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Illustration shows Microbore cluster tools for machining eight surfaces on a magneto plate at one pass. Each tool is independently adjusted by proven micrometer vernier principle and concentricity of work piece is maintained to precise limits on production runs.

For the latest developments
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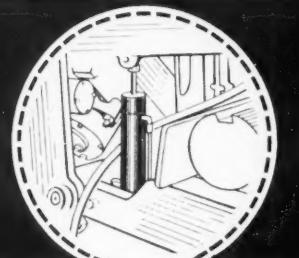
480 Fair Avenue • Ferndale 20, Michigan, U.S.A.

convenient to provide for automatic disengagement of feed on each tool. On some boring mills, this is done through the use of multiple stops. For this purpose, the crossrail slide is provided with a pentagonal rod having five adjustable stops. These stops can be set to disengage the feed by means of limit switches. The side head on one highly efficient machine of this type is so designed that it may be equipped

with a similar device.

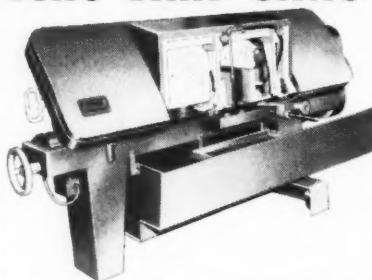
While the turning of profiles is not so often performed on vertical boring mills as on machines of other types, there are cases where it is advantageous to use a boring mill for profile turning. In such cases, it is possible to use tracer control. Some boring mill manufacturers provide profiling devices operating by means of an electric tracer control. On one machine of turret type incorporating a side arm, such controls are sometimes applied both to the crossrail head and to the side arm. The tracer is fitted to the tool slide and moves along the profile plate, which is shaped like the workpiece to be machined. This profile plate controls the motion of the tool post by means of electromagnetic clutches.

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CUT
THIN WALL
SECTIONS
BETTER



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Why? Because Kalamazoo's hydraulic frame control is coordinated with the feed control to give just the right blade pressure for smoothest, most accurate cutting of tubing and thin wall sections. In addition, the saw frame cannot drop accidentally and damage material or saw blade. Yes . . . here's another reason why Kalamazoo is synonymous



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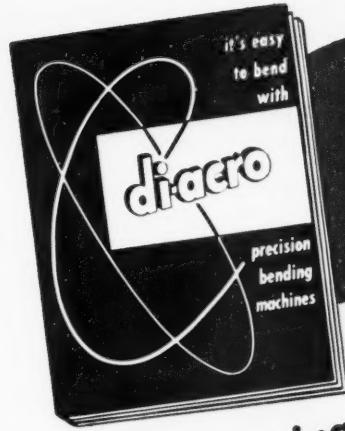
MACHINE TOOL DIVISION

Kalamazoo TANK and SILO CO.

1110 HARRISON ST., KALAMAZOO, MICHIGAN

**Grinding
on Boring Mills**

Grinding operations are often performed on vertical boring mills. On mills incorporating turret heads, some type of adapter can always be devised for one of the stations in the mill



a new practical 32 Page
diacro
BENDING MANUAL

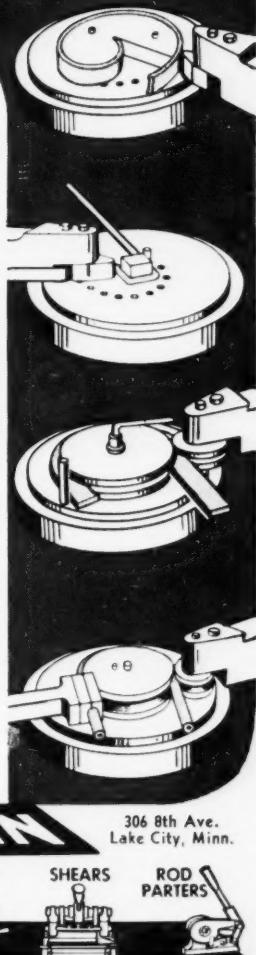
by the originators of "Die-less Duplicating"

This instructive and authoritative booklet will quickly prove itself indispensable wherever bending is done or is needed. It brings you a veritable gold mine of tested, authentic bending methods applicable to any rotary type bender. The proper bending technique may frequently offer a new approach to an old problem by simplifying product design and cutting production costs.

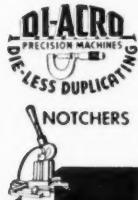


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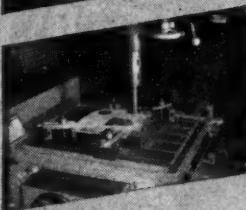
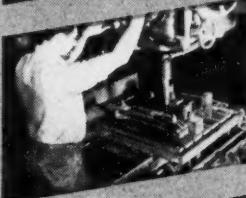
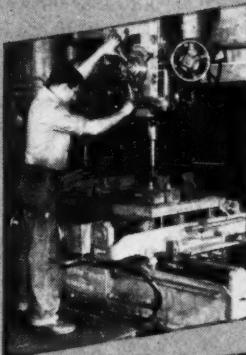
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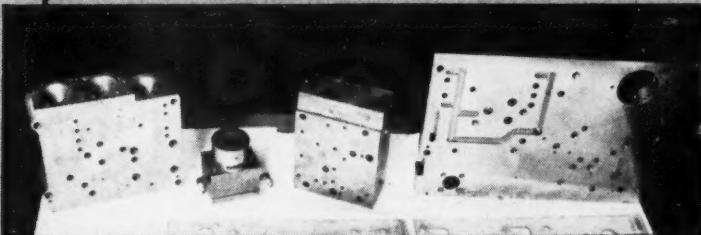
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crossrail and from the top of the machine frame. It extends outward at a right angle to the main rail, being equipped with a saddle and toolhead of its own. Such machines are most often found in job and repair shops.

In the interest of rigidity when using an extension mill, it is good practice to move the uprights no farther back from the table than necessary to allow for clearing the diameter of the

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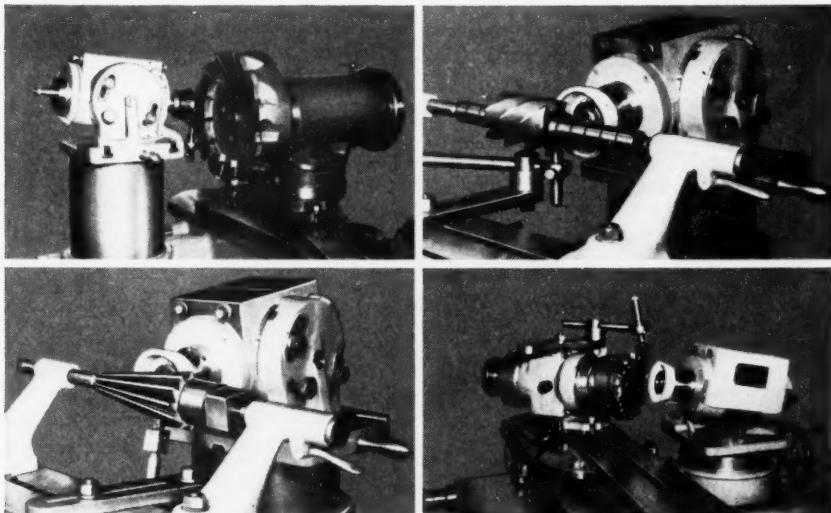
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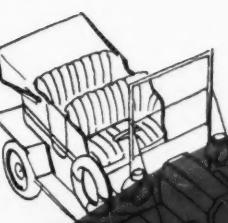
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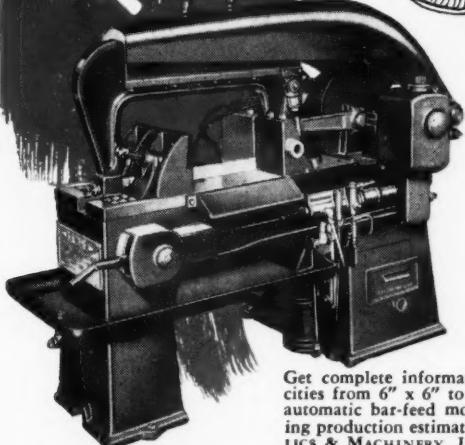
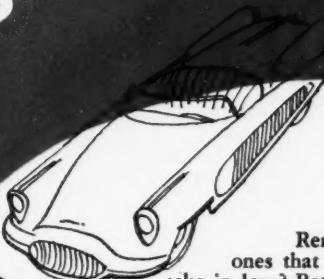
pieces mounted on the machine table. In addition, the crossrail and machine columns may be completely removed when desired to allow for performing of boring and facing operations involving work of larger than normal swing. Such large work is supported firmly on the bed and floor plates which surrounded the table of the machine. Special tools provided with power feed are then mounted on and revolved by the table.

Whereas on many huge boring mills the toolhead saddles are provided with a platform so that the operator can ride the saddle, with the type of setup just described (where special tools with power feed are mounted on and revolved by a boring mill table) the operator usually rides the table to watch the cutting tools. Therefore, the table is equipped with electrical plug outlets at the center. From these plugs flexible leads supply light and power to the special boring tools as well as current to a portable push-button station, thus providing the operator with complete control of the table motions. The boring mill table operates on replaceable tracks of Formica, and a special method of lubricating these tracks is employed.





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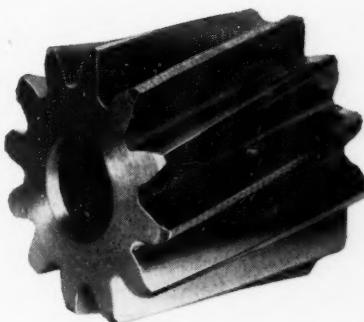
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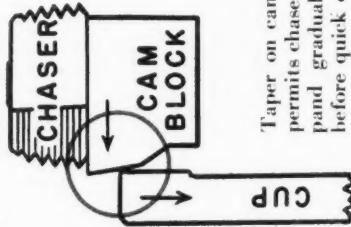
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Indexing Fixture for Milling Irregular Polygonal Shapes

By W. M. HALLIDAY

The author describes a unique fixture which eliminated difficulties in machining unusual workpieces.

THE sketch in the lower right-hand corner of Fig. 1 shows a very unusual type of pin component, the milling of which presented certain difficulties. This component, shown here in enlarged view, was required in large quantities as an insert member for a molded plastic article. It comprises a brass cylindrical shouldered pin $\frac{1}{4}$ inch in diameter on the smallest portion and having a five-sided flat formation machined at the extreme right-hand end of the type shown in the end view. It should be noted that this flat formation has five sides which are all unequal in width, and thus does not constitute a regular pentagonal prism. This flat formation had to be produced to the closest accuracy with regard to the size of the respective flat portions and their axial relationship with the shank of the pin.

Because of this irregular non-standard shape, conventional indexing means could not be employed for accurately locating parts in the milling fixture to ensure economical production of the large volume required. The front elevation, end view, and plan diagrams in Fig. 1 show an effective design of indexing milling fixture, specifically developed to simplify the setting, indexing, and milling of these flat formations to the closest precision limits.

The fixture consists of a T-shaped body casting, **A**, in the substantially proportioned horizontal base of which are hold-down holes, **B**. Located at the foot of the upright integral column portion, **C**, at its left-hand side is a bearing boss, **D**, cast in position with the part. Over this boss is very closely fitted the slotted lower end of a swiveling arm casting, **E**, which is fulcrumed over a hardened tapered shaft, **F**. The latter is headed at one end and is fitted with a small pin, **G**, to slide easily in a keyway, **H**, in one side of the bored hole in the arm. This pin, and so on, prevents rotation of the arm on the shaft. At the opposite end of the shaft, a reduced diameter threaded portion is provided for check nuts, **I**. These nuts have to be carefully adjusted and locked to the shaft so that the arm will swivel smartly with a minimum amount of working clearance or slackness.

Interposed between the integral head of the shaft and the adjacent side of the arm boss is a thin soft copper washer, **J**, which can be easily compressed a slight amount when having to adjust the shaft to take up wear in the tapered hole in the bearing boss **D**. By using a tapered shaft of the type illustrated, provision is available for quickly taking up such wear to ensure

an accurate fit for the arm.

In about the center of arm **E** is an elongated narrow slot, **K**, within which is loosely fitted the shackle end **L** integral with rod **M**. The former is pivoted over a headed pin, **N**, passing

pins, **Q**, located on the same horizontal center line, one at each side of the slot. Rod **M** has a free-sliding fit within the bore of the trunnion and projects a certain distance from the right-hand side of that member. This portion of

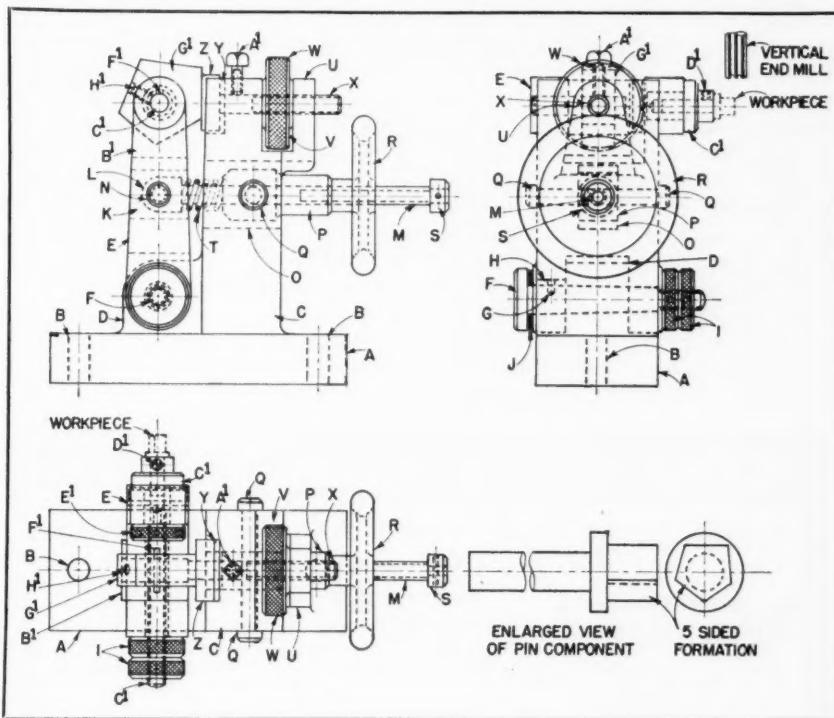


Fig. 1—Drawing illustrating design of indexing fixture for milling irregular polygonal shapes, such as shown in lower right-hand corner.

through the arm and secured therein against rotation. At an adjacent point to this slot, the upright column portion C is machined to form a large rectangular slot, O, which passes through the full width of the member. This slot provides a clearance housing for a hardened steel trunnion, P, which in turn is pivoted on two short headed

the rod is threaded for a lightweight aluminum handwheel, **R**. A small stop collar, **S**, is cross-pinned securely to the extreme end of the rod to limit the backward movement of the handwheel.

A stiff compression spring, **T**, is interposed between the trunnion **P** and the shackle **L**, encircling the rod as shown. The purpose of this spring is

to urge the arm **E** away from the column portion when the handwheel is released and operated toward the right. The shackle and trunnion members swivel the required amount to permit such radial movements on arm **E**.

Formed integrally on the top right-hand side of the column is an extension lug, **U**, which is slotted, as indicated at **V**, to accommodate a circular knurled adjusting nut, **W**. This nut is threaded over a cylindrical steel pin, **X**, which has a sliding fit within a hole bored horizontally through the column and lug portions and which lies parallel with the base of the fixture. The sides of the adjusting nut are a close fit within the slot to prevent undue endwise movement of pin **X**.

In the top left-hand side of the column **C** and central with pin **X** is milled a parallel sided slot, **Y**, of shallow

depth but considerable width. Within this slot, a rectangular head portion, **Z**, formed integral on pin **X** is made a close sliding fit so that the pin will be unable to rotate. A small set screw, **A¹**, is situated in the top of the column for locking the headed pin **X** in any horizontal setting relative to the left-hand vertical side of the column. Pin **X** will have only a short amount of horizontal movement through the column for a purpose to be explained later when describing the setting and operation of the fixture. The left-hand endface of portion **Z** should lie perpendicular to the base of the fixture, as illustrated.

In the upper end of arm **E** a wide deep slot, **B¹**, is machined approximately central in the width of the part. Each side wall of this slotted portion is bored axially in line and parallel

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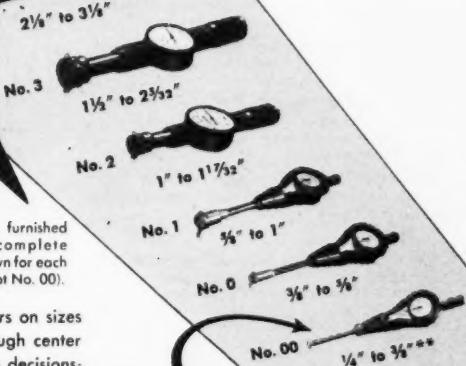
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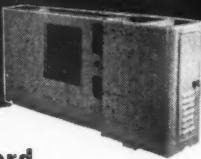
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with the fixture base for a shouldered hardened shaft, C¹, the bearing holes being of different diameters. The workpiece to be end milled for the five-sided flat formation is mounted in the end of this shaft, for which purpose the larger shouldered end is concentrically bored $\frac{1}{4}$ inch in diameter for a sufficient depth. A small locking screw, D¹, enables the workpiece to be secured in the shaft.

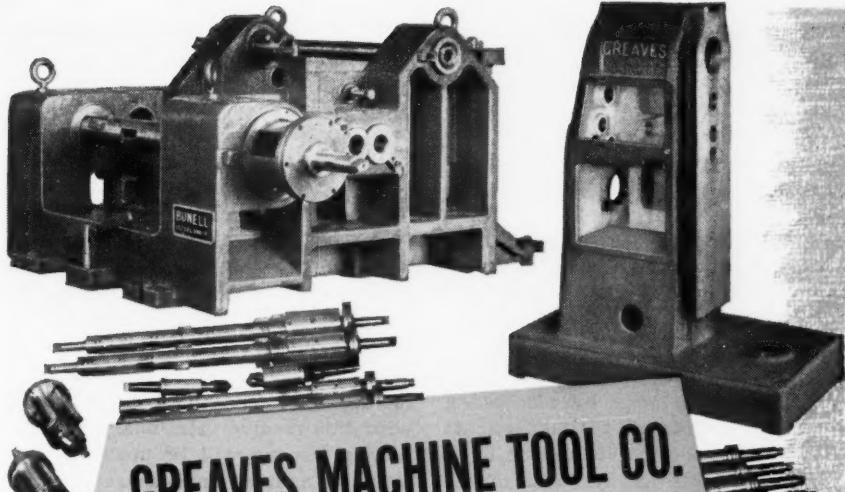
Immediately beyond one side boss of the arm member is a knurled circular locking nut, E¹, which is threaded onto the shaft at that point and which will lock the shaft in place when tightened against the inner side wall of the arm boss. During the actual milling operation, the shaft should not rotate within the bearings of the swiveling arm E, as will be clearly understood later.

The middle parallel portion of shaft C¹ situated in the wide slot B¹ has a feather key, F¹, for engaging within the keyway in the bore of a master form block, G¹. The latter, which is made of hardened steel, is machined with five sides exactly to the same angles as those required on the flat formations on the component. The block is keyed to the shaft and retained thereon by means of a headless locking screw, H¹, situated on one side.

Preferably, this master form block should be made several times larger than the flat sizes on the finished workpiece. In Fig. 1, the form block shown is five times larger than the flats on the work. Any slight errors occurring in the machining of the form block will be reduced to one-fifth scale on the finished workpiece, thus ensuring very close accuracy on the latter.

It will be observed from the lower plan diagram that form block G¹ is set approximately central with the rec-





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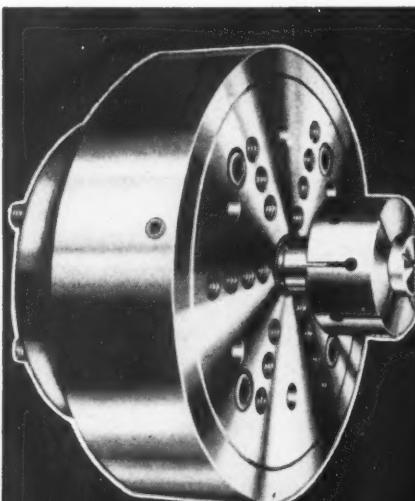
tangular head **Z** and slot **Y** in the upright column member. The thickness of the block is also about half that of slot **Y**. The form block is fitted to shaft **C¹** and rotates with that member during the indexing movements, as to be explained.

Fig. 1 shows the fixture set up for milling the first of the five flats on the end of the workpiece, an operation performed by an end-mill cutter in the vertical position. In setting the device for this first position, the arm **E** will be retracted away from the column a short radial distance by slackening handwheel **R**. This will permit the shaft **C¹** carried in the top of the arm to be swiveled so that one flat side of the form block **G¹** may be brought in line with the end of the pin head **Z**. By readjusting the handwheel, the arm is drawn toward the column so that the

flat side of the form block is bearing against the pin head **Z**. Further turning of the handwheel imparts the necessary locking pressure to hold the arm, and so on, against cutting forces.

According to the size of the form block **G¹** and the particular shape to be milled on the workpiece, pin **X** may require a certain amount of adjustment within the column so that the sides of the form block may make contact therewith when the arm is approximately in the vertical position as shown. Such adjustment will be accomplished by turning nut **W**; however, with this member stationary, at any setting the pin will be positively restrained against endwise movement, thus providing a solid support for the clamping of the form block.

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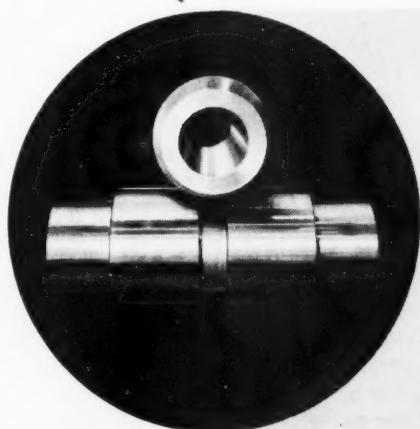
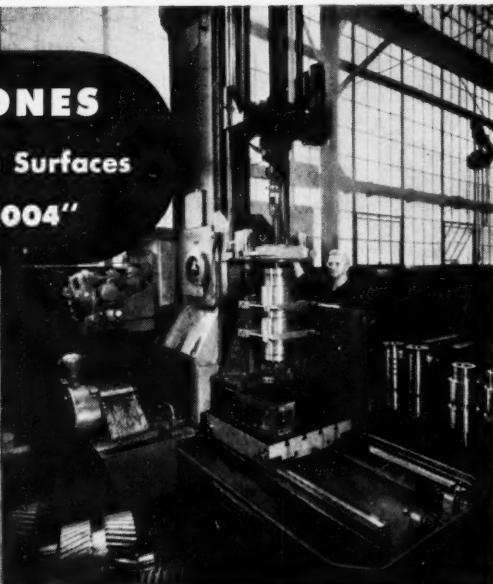
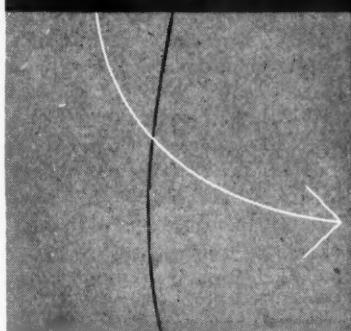
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For production of boring machine spindle sleeves with a 5" bore, a prominent machine tool firm* specifies rigid .0002"- .0004" tolerances. **BARNESDRIL** Honing Machines meet those exacting requirements . . . and achieve highest standards of roundness and straightness of bore. Selected lubrication surface pattern is held consistently.

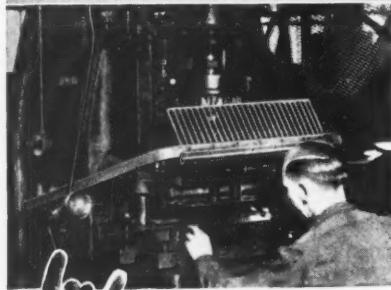
BARNESDRIL Honing Machines offer production insurance on *your* critical surface requirements. Use **BARNESDRIL** skills, tailored to your needs . . . consult a **BARNESDRIL** Engineer today.

* Name on request.

BARNESDRIL

BARNES DRILL CO.
860 CHESTNUT STREET • ROCKFORD, ILLINOIS

A TRAGIC PENALTY FOR ONE MISTAKE



Operating an unguarded press is an invitation to tragedy, suffering and expense.

JUNKIN automatic safety guards for presses are helping thousands of enthusiastic users set new safety records . . . higher production schedules. JUNKIN guards operate automatically from foot pedal, fall by gravity to bolster plate. Press can't operate until guard is in position.

Write For This New Bulletin

If you would like the facts about Junkin Safety Guards, write. There's no obligation.

Junkin Safety
Appliance Co.,
Inc.

101 S. Floyd St.
Louisville, Ky.



JUNKIN SAFETY GUARD

C¹, with the size being determined by the adjustment of the machine slides, for which positive stops should be provided after the usual manner. After milling the first flat from the fixture setting shown herewith, it will be necessary to rotate shaft C¹ a small amount so as to bring the next flat face of the form block in contact with the head Z in a similar manner. This will be achieved merely by releasing the handwheel, swinging the arm to the left, slackening lock nut F¹, and moving the shaft as desired.

Before tightening up lock nut F¹ at this second indexing, the arm should be drawn to the right to bring the form block against the head Z. After locking pressure has been applied by means of the handwheel R, nut F¹ may be tightened to secure the shaft to the arm E. The remaining flats on the work will be milled in an identical manner after indexing the shaft C¹ in the manner described.

The form block G¹ throughout the machining of the entire batch of parts, and its alignment with the member Z may be easily sighted. Having wide and long flats, a substantial surface area is presented for bearing against the end of part Z, thus ensuring adequate support to resist locking and cutting pressures. It will be appreciated that any number of flat formations of a similar irregular kind may be reproduced by this indexing method, the only requirement being to make up an enlarged master form block for mounting on shaft C¹ exactly in the manner described above.

For further information on any product mentioned in this issue—use the READER SERVICE CARDS between the covers.

Accurate Rake Angles



BESLY
TAPS

UNSURPASSED ACCURACY
at all vital points



Microcentric CHAMFER



Solid Ground
THREAD FORM



Accurate RAKE ANGLE



Mirror Finish FLUTES



Tru-Square DRIVER

BESLY-WELLES
CORPORATION

Established as Charles H. Besly and
Company in 1875.

108 Dearborn Ave. BELOIT, WISCONSIN
BESLY TAPS, DRILLS, REAMERS
BESLY GRINDERS and ACCESSORIES
BESLY-TITAN ABRASIVE WHEELS



mean better
threaded parts...
longer Tap Life!

ON scores of production jobs the *precise* rake angle determines the quality of the threaded piece while adding appreciably to the useful life of the tap.

Besly Tap users can specify rake angle in degrees where difficult jobs require it . . . and call for this angle on repeat orders with the knowledge that *the angle specified will be delivered* tap for tap, and lot for lot!

Whether your jobs are simple or complex, you can rely on Besly to deliver a consistently accurate tap . . . designed, manufactured and inspected to meet every requirement of today's close tolerance work.

Ask your nearest Bestly Distributor about a Trial Run on any tapping job and details on Besly's PLUS SERVICE on "Specials".

BESLY-WELLES CORPORATION, 108 Dearborn Ave.,
Beloit, Wisconsin
Please send Free manuals as checked.

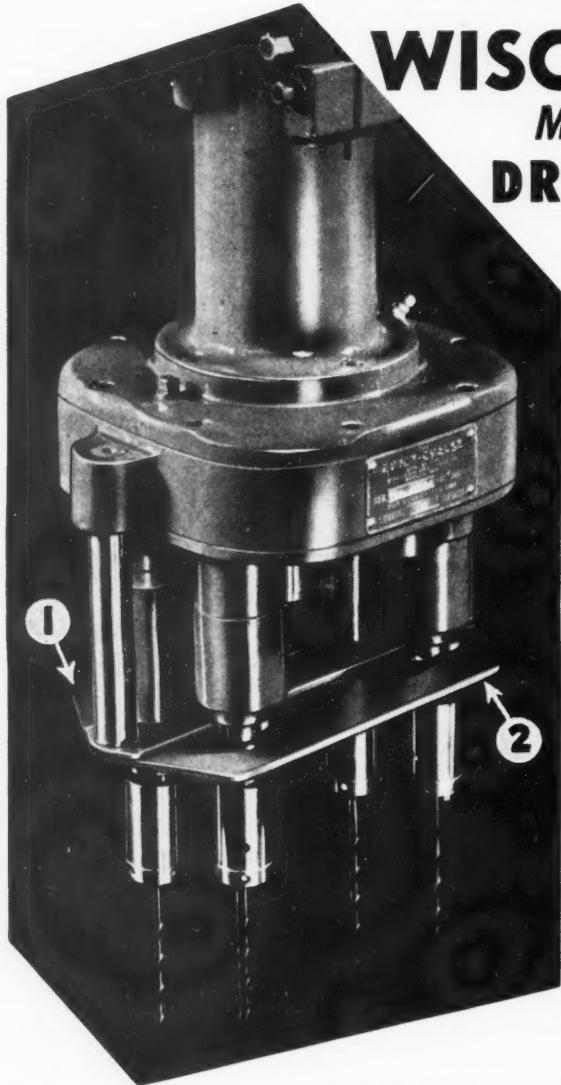
TAP APPLICATION GUIDE TAP CATALOG
 DRILL CATALOG

NAME _____

COMPANY _____

ADDRESS _____

CITY _____ ZONE _____ STATE _____



WISCONSIN

Multiple DRILL HEADS

Adjustable and Fixed-Spindle Types

Adjustable Spindle Heads have Dual Positioning Plates for fast, accurate set-ups that "stay put".

Positioning and Locking Templates are furnished for each bolt circle or hole pattern . . . to your exact specifications.

Half-hole Positioning Plates (1) make it easy to swing spindles into place quickly. Locking Plates (2), with full holes, are mounted on support posts to lock set-ups securely against shifting.

6 Capacity Ranges . . . from "Light Duty" to "Extra Heavy Duty". Standard Models have 2 to 8 spindles. Special Models built to order.

1. Half-hole Positioning Plate.

Send print of Hole Pattern for estimate.

2. Locking Plate has full holes to hold spindles in place.

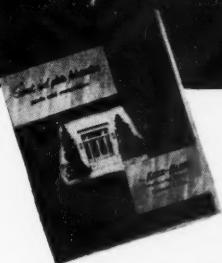
WISCONSIN DRILL HEAD CO.

4985 N. 124TH ST. • BUTLER, WISCONSIN

SHEET METAL FABRICATION

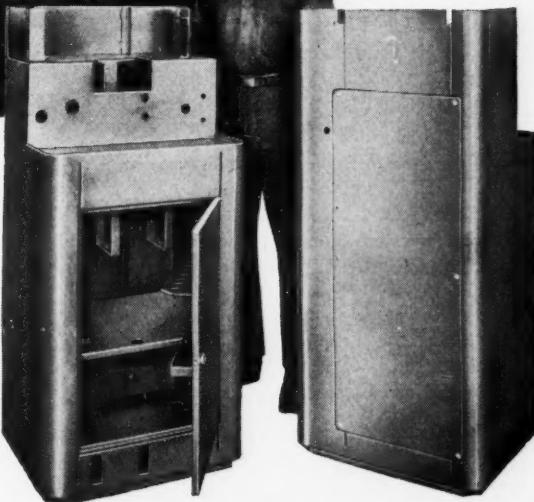
BY

KIRK AND BLUM



Write for New Bulletin F-3,
SHEET & PLATE FABRICATION

This 40-page comprehensive booklet shows typical examples of Kirk and Blum fabrication, complete facilities of plant and equipment for jobs ranging from one unit to thousands.



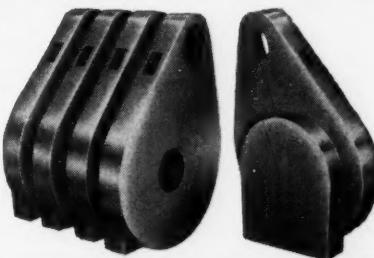
CONTRACT MANUFACTURING FACILITIES

Whatever your requirements in sheet, plate and alloy fabrication, Kirk & Blum can produce for you... economically and quickly.

Complete facilities to $\frac{1}{2}$ " capacity for square and rotary shearing, braking, forming, rolling, punching, riveting, welding, grinding, drilling and finishing sheets, light plates and structurals.

For complete details, write for literature on fabrication facilities and experience or send prints to:

THE KIRK AND BLUM MANUFACTURING CO.
3203 FORRER STREET • CINCINNATI 9, OHIO



KIRK AND BLUM

METAL FABRICATION

Modern Messenger Service

By ERVIN MCKNIGHT

THE original idea of a messenger was limited to one who carried a message. The term later expanded, industry-wise, to include those who went on errands with cash, mail, light loads, small tools, blueprints, and so on. There are plants where all this work is still done on foot by errand-runners. Large plants have put messengers on bicycles, or in some cases on motorscooters, to very good effect. Modern signal systems, working in conjunction with acoustic telephone

booths, have eliminated the need for actual message carriers in many plants. Other types of communications systems have replaced even more.

Probably the most significant proposition relative to placing messenger service on an economical basis is a system which delivers both messages and lightweight loads of various departments in the plant from a central desk. Instantaneous, accurate and efficient dispatching service is found in an increasing number of plants in the form of a pneumatic tube system. Any department in a large plant served by such a system can send or receive from any other by way of a central desk, as shown in the accompanying illustration. Operators at the desk of some large systems of this kind speed message containers to various stations

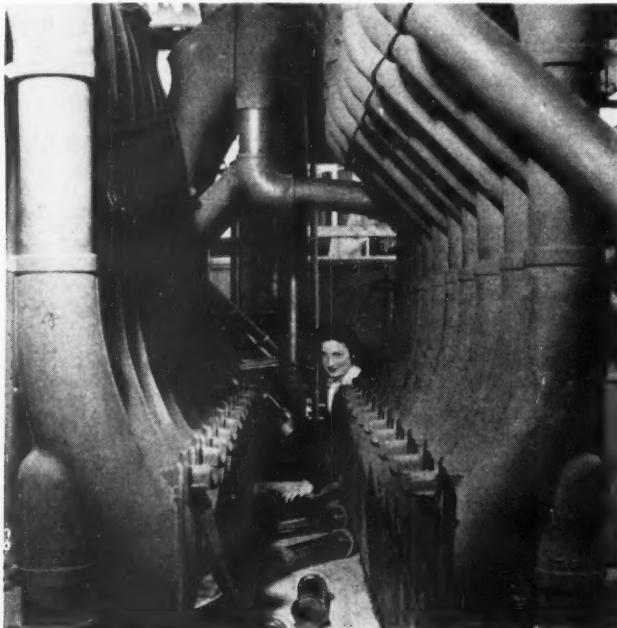
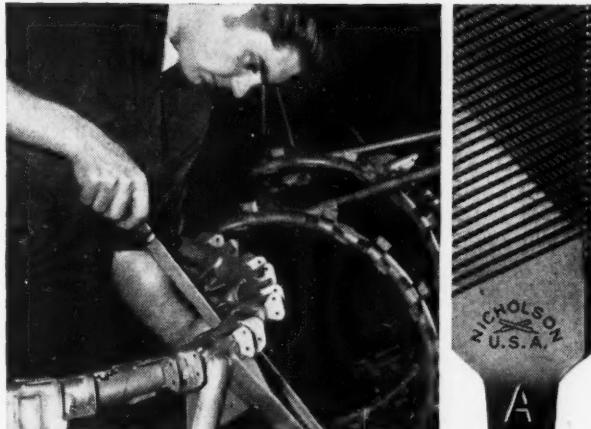


Illustration showing view of central desk of pneumatic tube dispatching system.

(Right) A filing operation on an aluminum-alloy structural part for a Boeing plane (Seattle plant).

(Far right) Nicholson Special Aluminum "A" File, designed for fast metal removal yet good finish. Special tooth construction minimizes clogging and "chatter."

(Below) B-47 jet bombers being assembled at Boeing Airplane Company's Wichita plant.



BOEING SPEEDS PRODUCTION with "The right file for the job"

The vast military program has made "faster production" a cry in every contributing industry . . . with thousands of tools and machines claiming the ability to respond. In few manual operations can speed and efficiency be more noticeably increased than in filing. And where Nicholson Special Purpose Files are used the results are usually outstanding. In them "Special Purpose" means special design for *special facility* in working on specific jobs and materials.

Nicholson is pre-eminent in file designing and manufacturing—*exclusively*. You'll do well in letting a technically minded Nicholson industrial distributor or field engineer help your parts-production and assembly-line superintendents in

assigning the right files to their difficult, unusual and mass-production filing jobs.

Sold through Industrial Distributors

FREE TECHNICAL BULLETIN
on "TEN SPECIAL FILE TYPES"

NICHOLSON FILE COMPANY

48 Acorn Street
Providence 1, R. I.
(In Canada, Port Hope, Ont.)



NICHOLSON
...A FILE FOR EVERY PURPOSE

NUMBERALL

CUTS THE COST OF STAMPING NUMBERS

Model 70

Multi-Wheel Numbering Machine

Maching and Shank
All One Piece.

The most efficient method of stamping numbers into metal. Repeats the same numbers until changed. Model 70 NUMBERALL Machines are used in all industries to mark various parts. Stamps numbers, etc., quickly . . . neatly. Perfectly aligned. Much better marks are produced by these machines than by single stamp or steel type, and at a far lower cost. Shank for Hand or Press and with any number of wheels from 3 to 20.

Write for
Bulletin MS-70.



AUTOMATIC INDENTING NUMBERING HEAD • MODEL 50

Automatic indenting numbering head for consecutive or repeat numbering. 1/32" to 1/8" high figures can be furnished in sharp face Gothic or shaded Roman figures. Can be used in foot or power presses.

Numbers: radio, airplane, tool parts, name plates, and other objects in brass, steel, fiber, plastics.



Model
50.

Heads are of sturdy construction and give uninterrupted marking service.

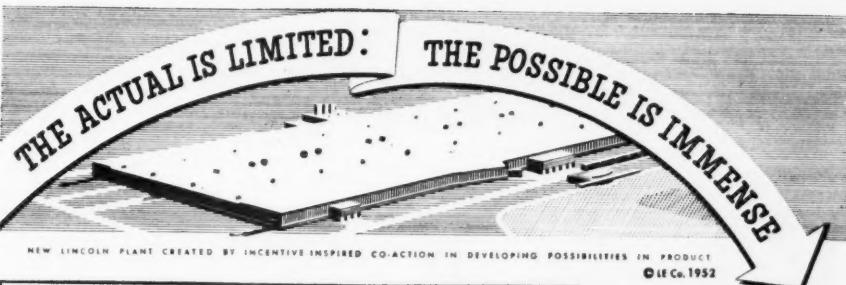
Write for
Bulletin
MS-50.

NUMBERALL STAMP & TOOL CO.
HUGUENOT PARK STATEN ISLAND 12, N.Y.

throughout the plant at the rate of one per minute, throughout a 24-hour day. In many cases, such a system speeds up transit of vital production-control communications over areas which previously took hours of travel by foot messengers each day.

Systems of this type are now often provided with single and double door silent delivery terminals. These may be arranged for down-delivery where tube lines are installed overhead, or for up-delivery where tubes run along the ceiling below a floor served. Systems of this type may operate either by pressure or by vacuum. Orders, messages, cash and credit sales slips, actual cash, light loads of various materials, small parts, mail, small tools, blueprints, and so on, may be successfully dispatched in this way. Carriers travel through the tubes at a rate of 30 to 40 feet per minute. Therefore, such systems are highly efficient in modern plants having a large volume of correspondence. They are safe, swift and economical.





NEW LINCOLN PLANT CREATED BY INCENTIVE INSPIRED CO-ACTION IN DEVELOPING POSSIBILITIES IN PRODUCT
© LE Co. 1952

BUILDS STRONGER MORE RIGID MACHINE BASE

••• cuts weight 36%, lowers cost 45%

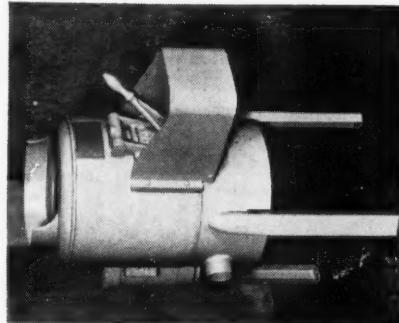
By A. H. Hallenbeck, Plant Manager
Gifford Wood Company, Hudson, New York

WELDED design has been adopted on many of our better quality machine components because of lower cost and better quality production with steel. As shown in the welded base (Fig. 2), lower weight with steel now saves on material cost as well as in transportation charges. Welded steel can be fabricated with simpler skills, helping to eliminate production bottlenecks in the shop. Components are pre-machined on light, fast machine tools prior to welding, saving time and cost of operating heavier prior shop equipment as was the case with cast construction.

Through welded steel, our shop now has better control of its work schedule. We are no longer dependent on outside sources for castings nor contend with storage and maintenance of pattern equipment.

Welded design makes it possible to meet price competition in our field where we were unable to do with the original cast designs. The product has a more modern appearance to improve selling appeal.

Fig. 3—Food processing machine for the Gifford Wood Company, Hudson, New York. Streamlined appearance is simple to maintain, easy to clean.



**WELDED DESIGN
ALWAYS SAVES STEEL
AND LOWERS COST**

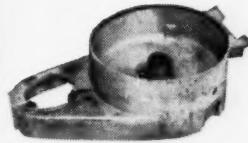


Fig. 1—Original Construction—Base for processing machine. Weighed 67 pounds. Material Cost—\$15.05; Machining Cost—\$7.34. Total Cost \$22.39.

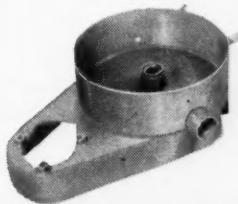


Fig. 2—Present Welded Steel Design—Stronger, more rigid. Weighs only 43 pounds. Material Cost \$2.50; Fabrication—\$9.77. Total Cost—\$12.27.

HERE'S HOW

Machine Design Sheets available on request. Designers and Engineers write on your letterhead to Dept. 256.

THE LINCOLN ELECTRIC COMPANY
Cleveland 17, Ohio

THE WORLD'S LARGEST MANUFACTURER OF ARC WELDING EQUIPMENT

Stearns MAGNETIC COOLANT SEPARATOR



CLEANS COOLANT

- AUTOMATICALLY
- CONTINUOUSLY

POSITIVE SEPARATION

For the positive removal of iron chips and entrained abrasive particles from coolant, be sure to use STEARNS Magnetic Coolant Separators. They're specifically designed to lower coolant costs and to give a better finish to the parts processed.

DEWATERED SWarf

Not only is the sludge removed from the coolant, but the greatest amount of coolant is returned to the system. An exclusive "bridge" dewatering the magnetic concentrate automatically, continuously.

SIMPLE TO INSTALL

Compact in design, the STEARNS Coolant Separator is easily installed to meet existing conditions. It is a permanent magnetic unit — therefore operating costs are extremely low.

WE MAKE IT!
Magnetic Brakes—Clutches
Drums — Lifting Magnets
Pulleys — Parts Separators



Foremost in the Magnetic Field

Stearns **MAGNETIC INC.**

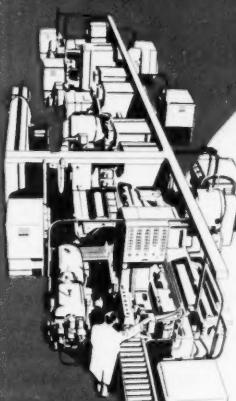
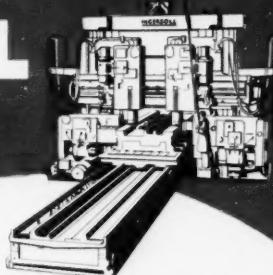
664 SOUTH 28th STREET

MILWAUKEE 46, WISCONSIN

INGERSOLL

CUTTER GRINDER

The Key to Maximum Production



An Ingersoll Cutter Grinder may cost only 1/100th as much as the production equipment it services, but its importance is far out of proportion to its price. Adequate facilities for grinding cutters accurately and quickly are essential to get maximum returns from large investments in costly production machinery.

You are undoubtedly sacrificing production

- (1) if you do not have enough Ingersoll grinders, or
- (2) if your present Ingersoll grinders are in need of replacement.

The Ingersoll Cutter Grinder . . .

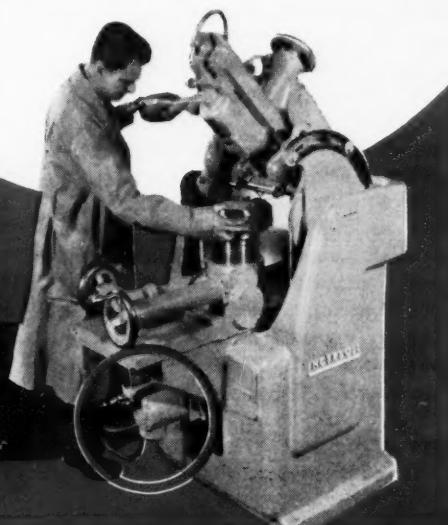
Grinds inserted blade cutters *more accurately* because the cutter is located on the grinder in the same manner as on the milling machine spindle.

Grinds cutters *faster* because the face, periphery, and corners are ground in a single setting of the cutter.

Write for Ingersoll Cutter Grinding Manual 50A.

The Ingersoll Spin-Grinding Attachment, available on new grinders, cylinder-grinds blades to uniform height on face and periphery. It reduces the time for sharpening a 10-inch heavy duty Shear Clear Face Mill with new T.C. blades from 2-1/2 hours to 2 hours.

THE INGERSOLL MILLING MACHINE CO.
ROCKFORD, ILLINOIS



Analyzing Business Regulations

By ROBLEY D. STEVENS
Management Consultant

Any unauthorized wage-salary boosts in your machine shop? Non-compliance with stabilization rules can prove very costly.

IF machine shop management has been following the press releases of the wage-salary stabilization program, it undoubtedly has noted that an increasing number of employers have been found in violation and hit hard by heavy penalties. For illustration, \$37,983 were assessed against one firm with only 40 workers; \$2,000 levied against another firm with 32 employees; \$3,952 levied against one more firm with 17 employees involved; and so on.

Now that wage-salary stabilization has been extended, undoubtedly, machine shop management is fully conscious of its responsibility for compliance. I have been handling a considerable amount of work for employers in various industries, and my findings, based upon an independent audit, indicate that a substantial number of them, through misunderstanding or honest errors, have neglected to provide factual data to support their claims. However, in other cases, employers have been operating on a past-practice formula which indicates their compliance and knowledge of the basic requirements thereof.

Particularly important to machine

shop management is that of salary stabilization affecting its executive, administrative, and professional personnel. Recently, an employer asked me these pertinent questions, worthy of evaluation by machine shop management: How do wage-salary stabilization investigators go about making cases against an employer? Where do they get tips and how do they pursue them? How does an employer know when he is in violation? What are the chances of escaping punishment for unauthorized wage-salary boosts since the program is a temporary one?

Not being engaged in an official capacity, I can't give precise replies. However, predicated upon my former law-enforcement experience with the Wage-Hour and Public Contracts Divisions, U. S. Department of Labor, I believe the enforcement procedures are about the same. That is, careful checks are made and appropriate action is taken in a given case. The theory of the case is that machine shop management might well understand that the wage-salary stabilization officials do have legal authority to act accordingly, and if a machine shop management is found in non-compliance, the rest is

U. S. DEPARTMENT OF LABOR
WAGE AND HOUR AND PUBLIC CONTRACTS DIVISIONS
AS AGENT FOR THE
WAGE STABILIZATION BOARD

Bureau of the Budget approval No. 44-R-908.

DO NOT FILL IN THESE SPACES

**REQUEST FOR A RULING UNDER THE REGULATIONS
OF THE WAGE STABILIZATION BOARD**

FOUR COPIES OF THIS REQUEST FOR A RULING ARE TO BE FILED WITH THE WAGE AND HOUR AND PUBLIC CONTRACTS DIVISIONS OF THE U. S. DEPARTMENT OF LABOR. SEE INSTRUCTIONS ON REVERSE OF YELLOW COPY OF THIS FORM

1. Name of employer: _____ 1a. Date: _____

2. Main office address of employer (street or R. F. D., city, and State): _____ 2a. Telephone No.: _____

3. Address of establishment involved in this request (if different from item 2 above): _____

3a. Industry: _____ Present products or services: _____

4. Does any duly recognized or certified labor organization represent any of the employees involved in this request for ruling? Check Yes () or No (). If "Yes," furnish the following information:

LOCAL NO.	INTERNATIONAL OR NATIONAL UNION	AFFILIATION	ADDRESS

It is suggested, but not required, that where a collective bargaining relationship exists this request for ruling should be signed below by both parties.

5. Statement of the question or proposal on which a ruling is requested, including the effective date of any adjustment. (Use reverse side of the form or attach additional sheets): _____

6. Have you ever requested a ruling or submitted a petition on the same or a similar question concerning a wage or salary adjustment? Yes No

If answer is "Yes," give name and location of the office to which such request was forwarded and approximate date: _____

7. Number of employees (estimate if necessary): _____

a. In the establishments involved in this request for a ruling: _____

b. To whom the proposed adjustment or schedule of adjustments applies: _____

8. Ruling requested by (check appropriate item):

An employee of the company A representative of the union Joint request by employer and union
 The employer A representative of the employer

(Signature) _____ (Title) _____ (Address) _____

(Signature) _____ (Title) _____ (Address) _____

NOTE.—THIS RULING IS BASED ON THE INFORMATION SET FORTH IN THIS REQUEST. IT DOES NOT CONSTITUTE A FINDING THAT THE INFORMATION IS TRUE. CONSEQUENTLY, THIS RULING HAS NO FORCE AND EFFECT IN THE EVENT THE FACTS ARE NOT AS REPRESENTED IN THIS REQUEST FOR A RULING.

Ruling: _____

For the Wage Stabilization Board: _____

(Signature) _____ (Title) _____ (Date of ruling) _____

WAGE AND HOUR AND PUBLIC CONTRACTS DIVISIONS

GPO 16-63064-1

easy for these crime detectives. And the whole matter could prove embarrassing if not costly. Therefore, the

basic requirements and exceptions of the wage-salary stabilization program should be analyzed with care.

REPORT OF INCREASES IN WAGES, SALARIES, AND/OR OTHER COMPENSATION

See accompanying instruction sheet before completing this form

This report is to be filed with the nearest office of the Wage and Hour Division of the U. S. Department of Labor within 10 days after increases are made effective under sections 1, 2, 3 of General Wage Regulation 6. In the case of executive, administrative, and professional personnel, and outside salesmen, the report is to be filed with the Wage Stabilization Board.

NOTE: Any doubtful question of interpretation and application should be raised with the Wage and Hour Division, as agent for the Wage Stabilization Board, before completing this form.

Do not write in this space

DOCKET NO. _____

DATE REC'D. W.H. _____

W.H. PER. NO. _____

W.H. OFFICE _____

DATE REC'D. WSB _____

I - GENERAL INFORMATION

COMPANY NAME _____

MAIN OFFICE ADDRESS (Street or R. D. No.)	(City, Zone, State)	TELEPHONE NO.
---	---------------------	---------------

ADDRESS(ES) OF ESTABLISHMENT(S) INVOLVED IN THE INCREASE DESCRIBED BELOW

TOTAL NUMBER OF EMPLOYEES ON PAYROLL OF ESTABLISHMENT(S) WHEN ADJUSTMENT WAS MADE	INDUSTRY (Furniture, Printing, Machinery, etc.)
TYPE OF ESTABLISHMENT (Factory, Mine, Wholesaler, etc.)	PRESENT PRODUCTS HANDLED OR SERVICES PERFORMED (List principal items only)
DATE INCREASE PUT IN EFFECT	RETROACTIVE DATE, IF ANY

REASON FOR SELECTING RETROACTIVE DATE

IDENTIFY AND DESCRIBE THE UNIT(S) FOR WHICH THE INCREASE WAS MADE AND EXPLAIN THE REASON FOR THEIR SELECTION

II - BASE PERIOD LEVELS: Furnish the information requested below for all employees in the unit(s) described above, for the first regular payroll period ending on or after January 15, 1950. WHERE INCENTIVE, COMMISSION OR BONUS EARNINGS HAVE BEEN PRORATED TO A PAYROLL PERIOD, THE MANNER IN WHICH THE PRORATE WAS CALCULATED TOGETHER WITH THE REASONS FOR THE USE OF THE PERIOD CHOSEN, SHALL BE FURNISHED ON AN ATTACHED SHEET.

UNIT	FIRST REGULAR PAYROLL PERIOD ENDING ON OR AFTER JAN. 15, 1950		TOTAL EMPLOYEES ON PAYROLL ACTUALLY WORKING IN APPROPRIATE UNIT	FOR WAGE OR SALARIED EMPLOYEES- TOTAL HOURS WORKED	A - FOR WAGE EMPLOYEES - AVERAGE STRAIGHT-TIME HOURLY EARNINGS (Cal. 6 ÷ Cal. 5)			
	ENTER MONTH, DAY AND YEAR							
	FROM (1)	TO (2)						
					B - FOR SALARIED EMPLOYEES- AVERAGE STRAIGHT-TIME EARN- INGS FOR PAYROLL PERIOD COVERED (Cal. 6 + Cal. 4) (7)			

Where space is insufficient attach continuation sheets referring to the applicable section of this form,
maintaining column arrangement

GPO-O-OPS 481

As most of our readers will recall, during World War II, wage-salary controls were operative. Today, wage-sal-

ary controls are still operative as a result of the recent congressional approval for extending them. In the light

III - GENERAL ADJUSTMENTS IN WAGES AND SALARIES BETWEEN BASE PERIOD AND JANUARY 25, 1951: With respect to the unit for which the increase is being reported. If any general adjustments have been made which changed average straight-time earnings by one percent or more in the appropriate unit between January 15, 1950 and January 25, 1951, the table below is to be filled out. (This includes increases permitted to be placed in effect under General Wage Regulation 2 of the Wage Stabilization Board.) If none have been made, write "None".

UNIT (1)	DATE OF ADJUSTMENT (2)	AVERAGE AMOUNT OF ADJUSTMENT FOR EMPLOYEES IN COL. 5 (Mark decreases with an asterisk)		TOTAL NO. EMPLOY- EES DIRECTLY AF- FECTED BY ADJUS- TMENTS, AT TIME OF ADJUSTMENT (5)	TOTAL NO. EMPLOYEES ON PAYROLL IN ENTIRE UNIT ACTUALLY WORKING AT TIME OF ADJUSTMENT (6)
		WAGES - Cents per hour (3)	SALARIES - Dollars per week or month. Specify (4)		

IV - INCREASES IN WAGES, SALARIES, AND OTHER COMPENSATION BETWEEN JANUARY 25, 1951 AND THE DATE OF THE INCREASES REPORTED IN SECTION V: Furnish the following information for each unit for which increases are being reported. If none, write "None". If any previous increases have been made under Regulation 6 for the units involved in this report give address of Wage and Hour office where report is filed.

UNIT (1)	DATE OF INCREASE (2)	BASIS FOR INCREASE (3)	AVERAGE AMOUNT OF INCREASE FOR EMPLOYEES IN COL. 6		NO. OF EMPLOYEES DIRECTLY AFFECTED BY INCREASE AT TIME OF INCREASE (6)	TOTAL NO. EMPLOYEES ON PAYROLL IN ENTIRE UNIT ACTUALLY WORKING AT TIME OF INCREASE (7)
			WAGES - Cents per hour (4)	SALARIES - Dollars per week or month. Specify (5)		

V - CURRENT INCREASES UNDER REGULATION 6: With respect to the unit for which adjustments under Regulation 6 are being reported, the form below is to be filled out. The amount of each increase in wages or salaries or in other forms of compensation should be specified in column 3 or 4. Describe on attached sheet or sheets the nature and terms of each increase listed in columns 3 and 4 below, the method of distribution, and the computation of the average.

UNIT (1)	DATE OF INCREASE (2)	AVERAGE AMOUNT OF INCREASE FOR EMPLOYEES IN COL. 5		NO. OF EMPLOYEES DIRECTLY AFFECTED BY INCREASE AT TIME OF INCREASE (5)	TOTAL NO. EMPLOYEES ON PAYROLL IN ENTIRE UNIT ACTUALLY WORKING AT TIME OF INCREASE (6)
		WAGES - Cents per hour (3)	SALARIES - Dollars per week or month. Specify (4)		

VI - SIGNATURES OF PARTIES SUBMITTING REPORTS: This report should be signed by:

- (a) Both the employer (or his representative) and an official of any labor organization which is recognized or certified as the representative of any of the employees covered by this report (OR)
- (b) Only the employer (or his representative) if the employees covered by this report are not represented by a recognized or certified labor organization.

Each of the undersigned certified that, on his best information, the answers contained in this form are complete and accurate.

FOR THE EMPLOYER (Print name and title of official)	SIGNATURE	DATE
INTERNATIONAL LABOR UNION (Print name and title of official)	LOCAL	
FOR THE LABOR ORGANIZATION (Print name and title)	SIGNATURE	DATE

of this situation, it would be best for machine shop management to be well acquainted with the basic requirements

and exceptions thereof.

The Economic Stabilization Agency has the supervisory responsibility for

the activities of (1) Office of Price Stabilization and (2) the Wage and Salary Stabilization Boards. The OPS still conducts a program of price stabilization, including the application and enforcement of price ceilings on numerous articles. The Wage and Salary Stabilization Boards conduct a program of stabilization of wages, salaries, and other compensation where necessary.

Wage-salary controls under stabilization involve a direct limitation on wage changes of a machine shop through a governmental administrative agency, including a series of limits for various employees. However, machine shop management, which clings to the basic requirements and understands the exceptions, should preclude unnecessary expenditures and afford itself efficient compliance thereof.

It is provided in the stabilization rules that wages, salaries, and other compensation were frozen as of January 25, 1951. However, stabilization under the Act does not mean to be an absolute "freeze" of wages, salaries, or other compensation, since the rules provide that any adjustments made should be made in such a manner as to prevent or correct hardships or inequities thereof. Yet, the fact remains that wages, salaries, or other compensation of employees of machine shops is prohibited unless in accordance with the "self - administering rules."

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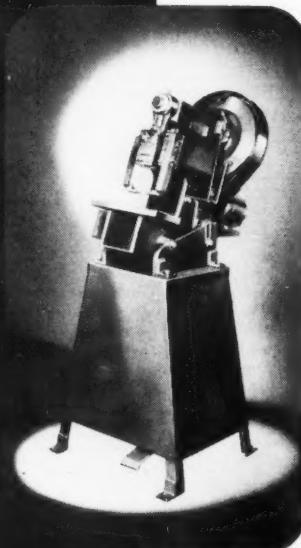
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Throat Height — 7"

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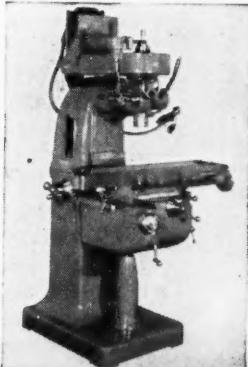


Remember "INDEX"

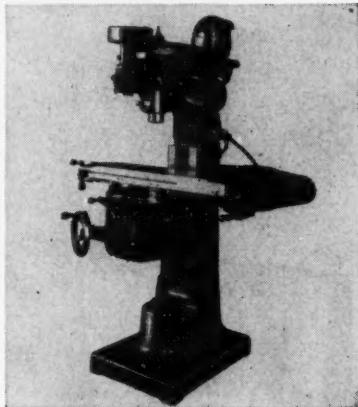
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MODEL 60 PLAIN HORIZONTAL MILL. A full No. 1 that equals or exceeds a light No. 2 in capacity. Designed for the average tool room, but its rigidity and low maintenance cost make it suitable for requirements of production shops. Standard Table 40" x 9" with larger table optional.

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In order that machine shop management may prevent evasion of wage-salary stabilization, it is provided that the words "wages, salaries, and other compensation" shall include all forms of remuneration to employees by their employers for personal services, including, but not limited to, vacation and holiday payments, nightshift and other bonuses, incentive payments, year-end bonuses, employer contributions to or

payments of insurance or welfare benefits, employer contributions to a pension fund or annuity, payments in kind, and other premium overtime payments.

Penalties for violations of wage-salary stabilization could be very heavy: for example, \$10,000 fine and imprisonment up to one year, or both, and disallowance for tax purposes of the entire wage-salary of employees improperly

increased. This, of course, would be something for machine shop management to blush about, primarily because wage-salary stabilization violations could wipe out profits.

Investigations have been underway, and the program of wage-salary stabilization is still in full swing. And it is expected that every specific complaint will be checked during the present fiscal year. Briefly, ceilings on wages, salaries, and other compensation at rates paid were fixed by General Regulation 1 which provided: "No employer shall pay any employee and no employee shall

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may increase production more than by faster cutting speeds.

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receive wages, salaries, or other compensation at a rate in excess of the rate at which the employee was compensated on January 25, 1951, without prior approval or authorization of the stabilization authorities." However, General Regulation 3 provides: "No action shall be taken under the authority of this title with respect to wages, salaries, or other compensation which is inconsistent with the provisions of the Fair Labor Standards Act of 1938

as amended, or the Labor Management Relations Act of 1947." In other words, machine shop management is authorized to increase wages or salaries of employees to bring same into compliance with these regulations.

Machine shop management that does not know the rules and does not understand the exceptions could possibly be caught between two vices: (1) it could watch its employees slide away to other employers having a higher pay

permissibility and find itself without sufficient manpower, or (2) it could pay the "going rates" and thus find itself in violation and subject to possible heavy penalties as a result of unauthorized wage-salary boosts.

Of interest to machine shop management is General Regulation 5 which provides for "adjustments for individual employees." The primary purpose of this regulation is to establish rules and procedures governing the administration of wage and salary structures within which increases in the compensation of individual employees in a ma-

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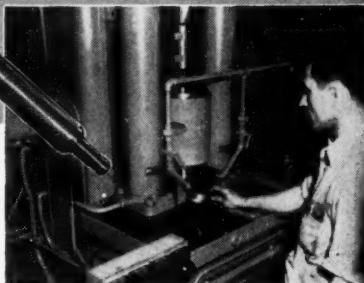
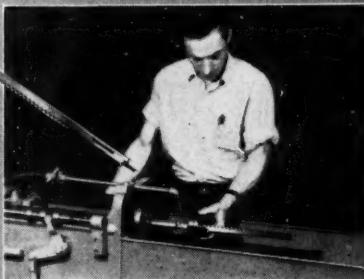
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chine shop may be made without specific approval.

Neither machine shop management nor its employees are very happy about wage-salary stabilization controls. However, whether we like it or not, it's best to know the wage-salary stabilization's musts.

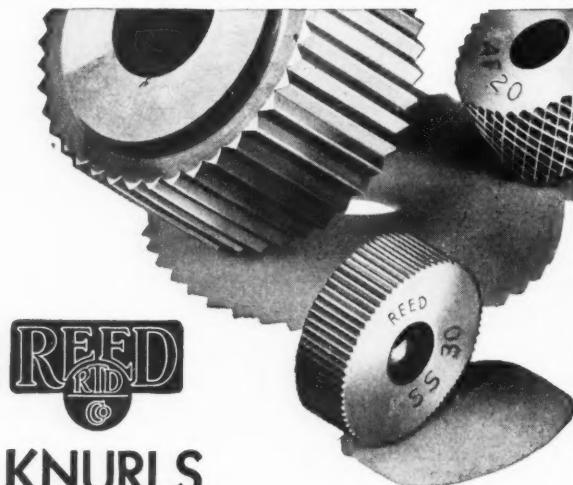
Again, General Regulation No. 6 provides for the 10 per cent formula. In other words, Regulation 6 imposed

no 10 per cent ceiling on wage adjustments. Nor did the stabilization officials order any machine shop management to give wage increases. In simple terms, it merely told an employer: If you haven't increased wages 10 per cent since January 25, 1950, you may raise them up to that figure without coming to the Board.

Another regulation, Number 8, is of interest to machine shop management because it provides for the "cost - of - living" increases to be made without prior approval.

However, the increases permitted by this rule must be based upon a "Consumers Price Index" published by the United States Bureau of Labor Statistics, or an index otherwise acceptable.

Particularly important to machine shop management is the matter of record keeping under stabilization. Is your machine shop keeping an accurate and complete record of general pay increases, promotion and transfer raises, ranges set for new and changed jobs, rates paid



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new employees, and so on?

Another factor to this wage-salary stabilization program is that which relates to salary stabilization. In other words, all persons in a machine shop employed in executive, administrative, and professional positions, as well as outside sales personnel, who receive salaries or other compensation are affected thereof.

While it remains to be seen how

tough the government will get about unauthorized wage-salary stabilization increases, machine shop management ought not to guess but be sure about its pay practices under the rules. All wage-salary boosts are not forbidden, but stringent rules have been laid down. To avoid the pitfalls, machine shop management should not adopt the "Gimbles don't tell Macy's" attitude when making wage increases.

Compliance

The best and most accurate way to ascertain a compliance status is to make a complete audit of the payroll records, checking each employee by employee and determining what wage-salary increases were granted with approval and those not authorized since the freeze date. In this way, machine shop management will know what adjustments have pierced the ceiling, and also whether it can justify such wage-salary increases. That is the method I use in conducting my "surveys" for employers. As an additional step, the machine

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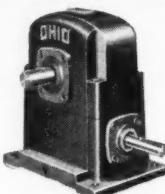
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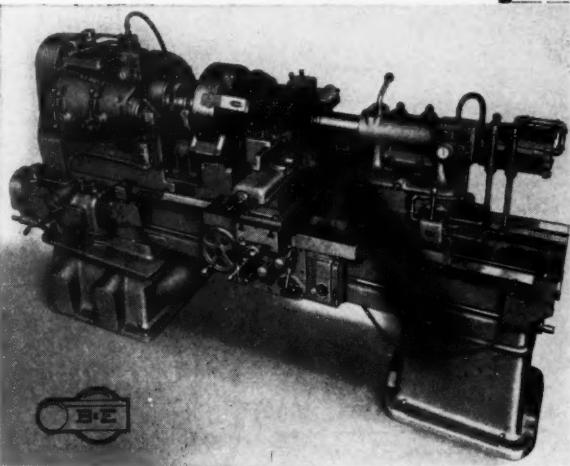
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shop management can check to ascertain if it has a minimum and maximum rate schedule for certain jobs predicated upon past practices. Assuming that these job classifications and rates in relation thereto are valid, increases beyond the rates would require approval.

Information such as job classification, name of employee, rate on freeze date, and any salary or wage adjust-

ments made should be checked for every employee in the machine shop. By so doing, the management thereof can determine what wage-salary increases are bona fide and what may be construed as a violation. However, if machine shop management is not certain about the increases granted, it would be wise to obtain a ruling and have a record of it for the files.

Undoubtedly, machine shop management as a whole wants to comply. However, the wage-salary stabilization authorities are primarily concerned about the small group who try to get around the law; that is, they are interested in catching chronic rather than occasional technical violators. Will your case of unauthorized wage-salary boosts be dismissed or found guilty as charged?

The wage-salary stabilization rules require careful analysis; keeping informed; having accurate records; and applying the exceptions to past practices. Sometimes, this requires a spot-check by outside counsel ra-

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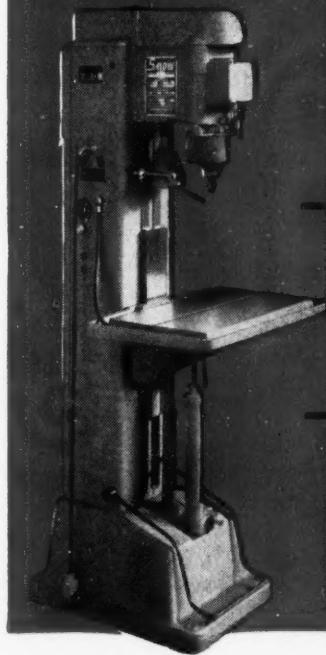
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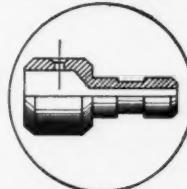
Crossdrill and C "T" Sink 1/16" Hole

Material—Brass

Production—4800 per hour

Fixture—# 15 Vertical index

Equipment—# 1-UD Drilling Machine



TAPPING

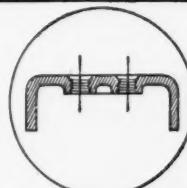
Tap Two #10-32 Holes

Material—Steel stamping

Production—3800 tapped holes per hour

Fixture—# 14 horizontal index

Equipment—# 1-UT tapping machine



THREADING

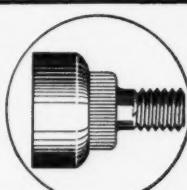
3/8"—24 Thread—1/2" Long

Material—Die Cast Aluminum

Production—2500 per hour

Fixture—# 10 Drum dial

Equipment—# 3-TR Threading machine



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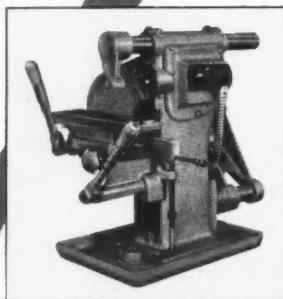
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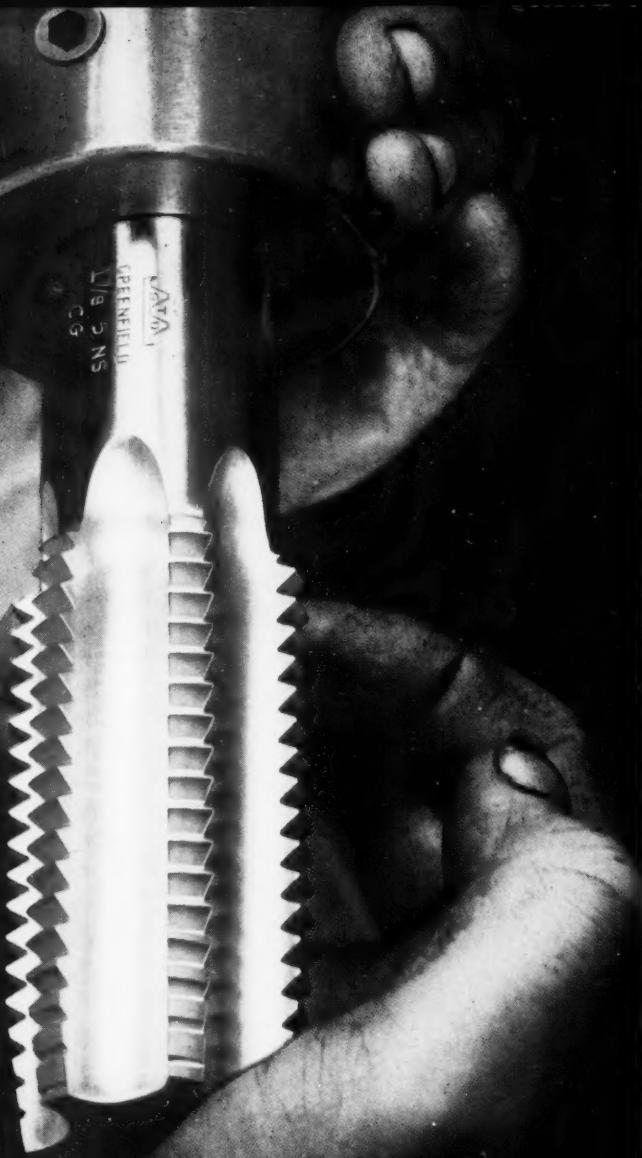
The **Burke** Machine Tool Co.
A Division of the
U.S.-BURKE MACHINE TOOL CO.
BROTHERTON ROAD 3
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ther familiar with law-enforcement practices of the government. Why take chances? Why not be prepared for possible investigations by auditing machine shop management records today?

Finally, if machine shop management has a plan for granting wage-salary increases it should certainly be fully aware of it. If you don't have a plan, you can still give certain increases, but the requirements are stricter. Your chances of survival are in the balance. Play it safe by surveying the situation today.

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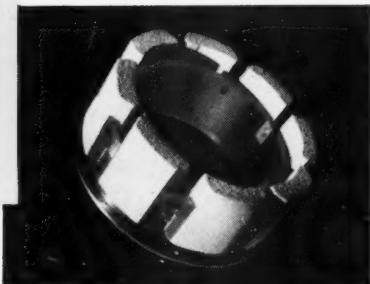
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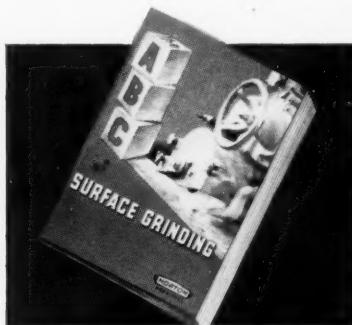
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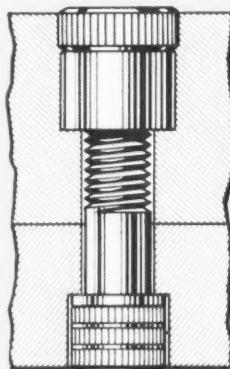
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December 1-6

Twentieth National Exposition of Power and Mechanical Engineering sponsored by the American Society of Mechanical Engineers, Grand Central Palace, New York City.

December 3-5

Society for Experimental Stress Analysis Annual Meeting and Exhibition, Hotel McAlpin, New York City.

January 19-22

Plant Maintenance Conference, Public Auditorium, Cleveland, Ohio.

January 26-30

Eleventh International Heating and Ventilating Exposition sponsored by the American Society of Heating and Ventilating Engineers, International Amphitheatre, Chicago, Illinois.

March 23-27

Eighth Western Metal Congress and Exposition sponsored by the American Society for Metals, Pan-Pacific Auditorium, Los Angeles, California.

June 16-19

American Welding Society National Spring Technical Meeting with Welding and Allied Industry Exposition at Shamrock Hotel, Houston, Texas.



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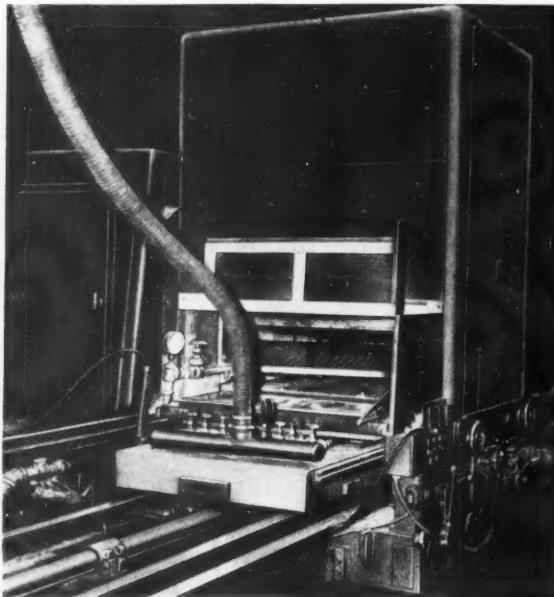
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Modified wide-belt abrasive machine used in The Carborundum Company's new method of producing tapered aircraft skins. (Abrasive belt has been removed to show rubber-faced contact wheel.)

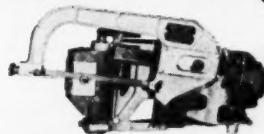
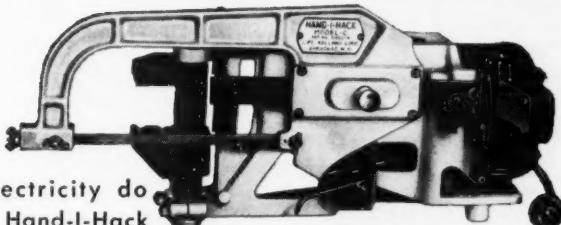
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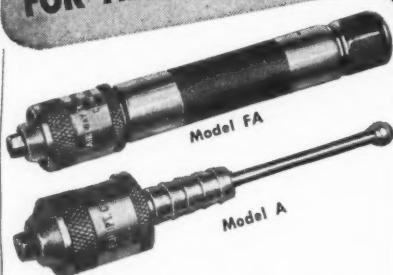
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ing tapers can be easily generated and finished skins can be produced at a considerably faster rate than heretofore, according to Bell officials. Quick, accurate, and steady holding of sheet is assured through the use of a vacuum chuck. As in other machining methods, the ground chips from the abrasive method are salvageable. With the abrasive belt process, tolerances of plus or minus 0.005 inch are claimed to be obtained. Micro finishes as low as 10 r.m.s. are said to be achieved with the fine grit belts. Moreover, the abrasive belt method is claimed to keep the work temperature below 100 deg. F., with the result that no metallurgical changes take place in the material. Under actual test conditions, abrasive costs were found to range from 12 to 15 cents per lb. of aluminum removed.

Dust Collectors Mounted on Casters to Salvage Diamond Dusts

UNTIL recently, there was no economical way to salvage industrial diamonds lost in the wearing away of diamond-impregnated grinding wheels and diamond-tipped tools used for truing and dressing grinding wheels. Today, however, companies like the Mineral Research Laboratory are prepared to reclaim bort and industrial diamonds from these dusts, provided they have not been mixed with wastes from grinding operations.

Where a diamond wheel is permanently installed as part of a grinding machine, segregation of these dusts presents no particular problem at Mineral Research Laboratory. A dust collector made by Torit Mfg. Co., 296

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Walnut St., St. Paul 2, Minn., is merely installed to serve only that machine. With this unit there is said to be no danger of any of the dust being lost, since the filters are constructed of an extra hard surfaced and tightly woven material to prevent particles from becoming enmeshed. A few strokes of a foot pedal shake the particles into a storage tray at the bottom of the cabinet.

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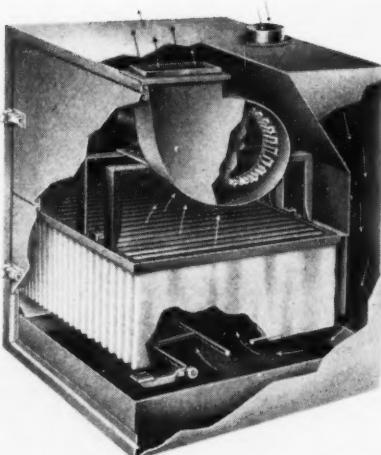
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Cutaway view of Torit dust collector showing operating principle used in the collection of diamond dusts for salvage

To collect diamond dusts from machines where diamond wheels are used only intermittently, Mineral Research Laboratory uses mobile Torit units mounted on casters. These units can be equipped with flexible suction tube assemblies which permit the dust collectors to follow the diamond wheel around the shop, keeping diamond dusts separate from ordinary operations. Similarly, these mobile dust collectors can be used to salvage dusts from diamond-tipped truing and dressing tools.

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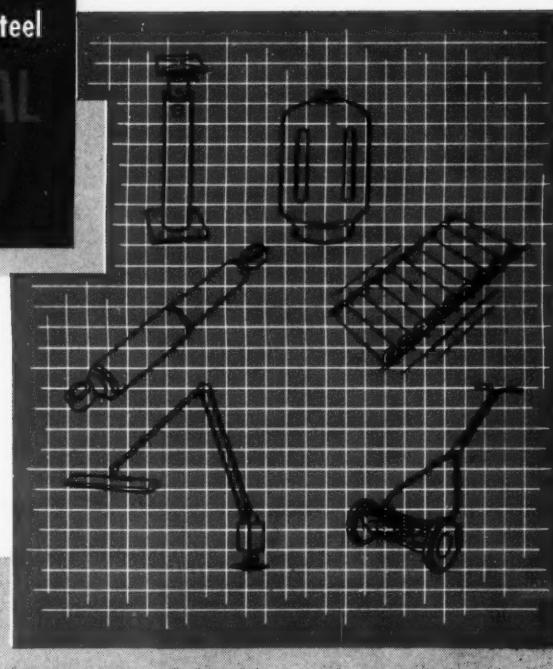
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TA-1609M



Piston balancing machine developed by The Morris Machine Tool Co., Cincinnati, Ohio, which provides a completely automatic cycle of operation for balancing automotive pistons at high speeds

Thus, a machine is required which will automatically remove the proper amount of metal so that each piston processed by the machine will be as identical to the one which preceded it as the one which follows.

The accompanying illustrations show a piston balancing machine recently developed by The Morris Machine Tool Co., 934 Harriet Street, Cincinnati

Automatic Piston Balancing

PISTONS used in automotive engines or other internal combustion engines must be of uniform weight to ensure accurate engine balance and smooth operation. Cast iron and aluminum pistons usually vary in weight considerably. Even after all machine operations have been performed, the desired weight is seldom acquired.

3, Ohio, which is designed to provide a completely automatic cycle of operation at unusually high production speeds. The pistons delivered to the machine are of conventional type and will, generally speaking, each comprise a circular cylindrical body having an open end and a closed head with conventional wrist pin holes and circumferential slots for receiving piston

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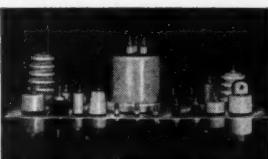
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rings. A pair of trim metal pads are provided, one on each side and adjacent to the open end of the piston skirt. The pads are designed to have a given maximum thickness and weight so that when trimmed to a lesser thickness, metal having a weight corresponding to the overweight of the piston is removed.

Pistons are automatically fed to the balancing machine by gravity along a channel type conveyor. The pistons

must first pass a testing mechanism which determines whether or not the piston is in the proper position to be received by the machine. If by accident a piston has been fed to the conveyor in an inverted position, a test finger will strike the piston head and the linkage controlled by the finger serves to lock the piston in position until it has either been inverted or removed from the conveyor line. Pistons which are passed by the test finger move on to be initially weighed and weight graded. If the piston weighs less than the designed piston weight, it is rejected from the machine and passes out through an underweight chute. If it weighs more than the designed piston weight and the excess weight exceeds a predetermined maximum, the piston is rejected through an overweight chute. Pistons which are overweight, and where overweight is equal to or less than the maximum, are allowed to pass on. The overweight and underweight chute doors are solenoid controlled by the weight

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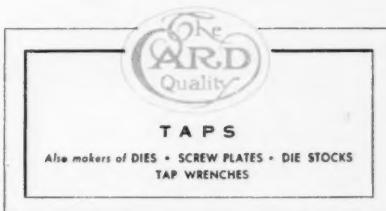
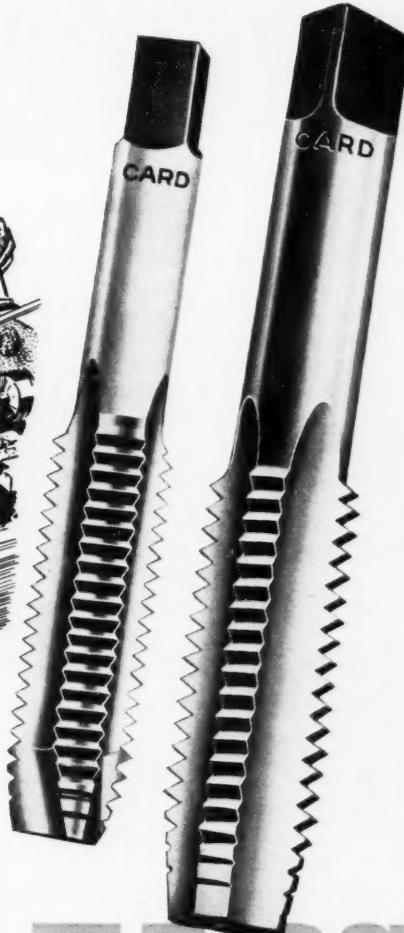


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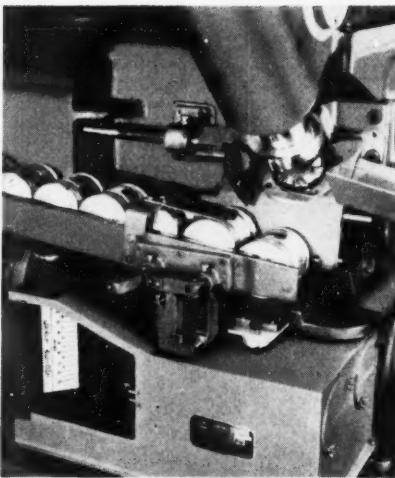
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grading scale. Pistons which are within the prescribed weight limits are gravity fed along the conveyor to a second scale. A piston advancing mechanism allows the foremost piston to move to the second scale and arrests the pistons which follow.

As the piston rests in the pan of the second scale, its weight is recorded by the position of the scale beam. A dashpot dampens the beam oscillations. When the beam comes to rest, the beam is clamped in place to record the weight of the piston. The position at which the scale beam is locked determines the depth of cut to be made by the milling cutter.

After the piston has been weighed on the cutter setting scale, the piston is raised from the scale to a cutting station by means of a transfer arm. At the cutting station, a collet is brought down upon the piston to posi-



Close-up view of piston balancing machine showing pistons being automatically fed into balancing position by gravity along a channel type conveyor

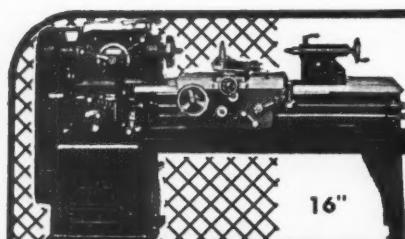
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tion the piston while the milling cutter is advanced along the axis of the piston internally. The piston pads are then trimmed to the predetermined setting of the scale beam so as to bring the weight to the designed limit within an accuracy of plus-or-minus one gram. Chip removal is effected by means of a suction chute. After trimming, the cutter is retracted from the piston and the piston is transferred from the cutting station to a discharge conveyor.



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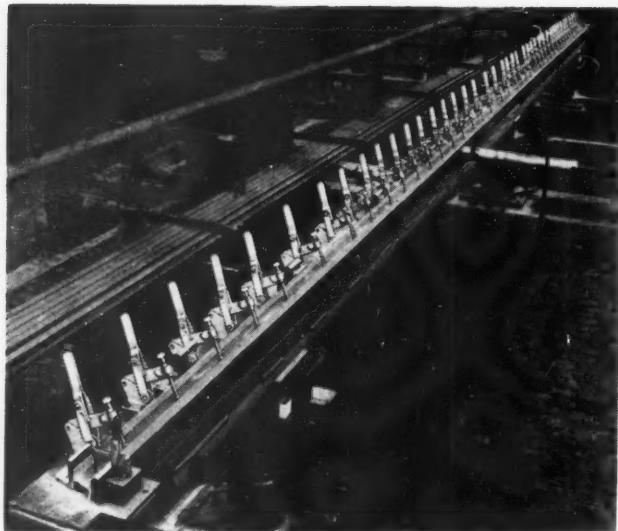


Fig. 1 — Illustration showing manner in which De-STA-Co toggle clamps are utilized at Kaiser-Frazer Willow Run plant to hold monorail drill jig

Toggle Clamps Aid Production of C-119 "Flying Boxcars" at Kaiser-Frazer

De-STA-Co toggle clamps manufactured by the Detroit Stamping Co., 349 Midland Ave., Detroit 3, Mich., are utilized on a Fairchild C-119 monorail drill jig at Kaiser-Frazer's Willow Run (Michigan) plant. Forty-one Model No. 340 clamps and two Model No. 207 clamps are used to hold the rail in position during drilling operations, as

shown in Fig. 1. An air-feed drill with automatic regulator drills $\frac{1}{4}$ -inch trolley stop locators in the rail, which is used in the aerial delivery system of the Fairchild C-119 "Flying Boxcars" — cargo personnel planes that are being effectively employed in delivering paratroopers and material to critical areas on the Korean front. Precision stamped from heavy-gauge steel, the No. 340 clamps feature a powerful compound toggle action that is provided through a handle designed with full hand clearance for easy, fast insertion and removal of work.

De-STA-Co toggle clamps are also being utilized on the build-up fixtures for Fairchild C-119 rear side panel in the Kaiser-Frazer plant. Model No.

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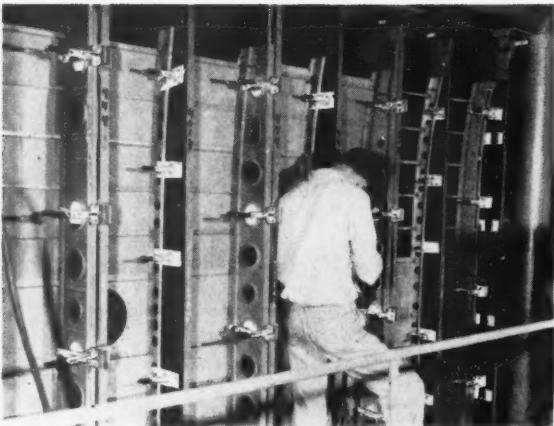


Fig. 2—Illustration showing use of De-STA-Co toggle clamps in holding horizontal stringers, vertical frames, and beams between frames during riveting operations at Kaiser - Frazer Willow Run plant

210 clamps are used to provide a positive holding action on the horizontal stringers, vertical frames, and beams between frames during riveting operations, as shown in Fig. 2. When the stringers, frame, and beams are fast-

ened together, the skin is positioned on the frame and rivet holes are drilled to size. The second step is to prepare the skin for riveting. The skin is removed from the frames, placed on a crimping machine, and crimped, following which an aircraft finishing seal is applied to the skin. After these operations are completed, the skin is repositioned on the frames and riveted in place.

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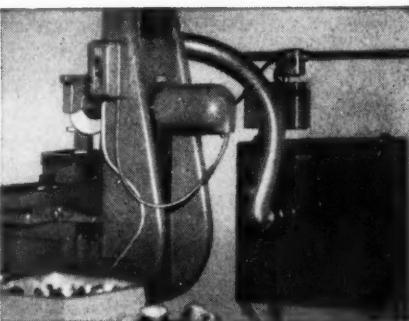
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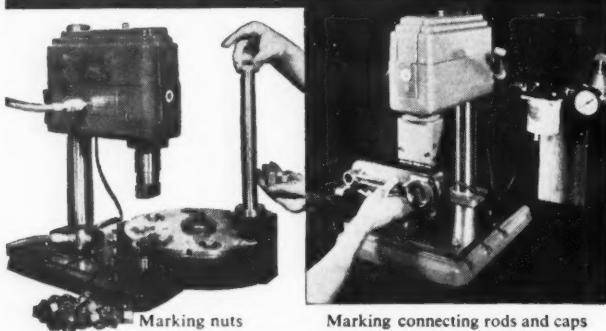
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DEPT. MMS-52

Machine Drills and Taps Five Holes Simultaneously in Aluminum Bezel

THE Beaver Machine & Tool Co., Inc., Syracuse, N. Y., recently machined and assembled for the Precision Castings Co., Inc., Fayetteville, N. Y., the drilling and tapping table illustrated herewith, which is designed to simultaneously drill and tap five holes in an aluminum bezel. The table



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includes five Locke air-operated drilling and tapping units; bezel fixture; clamp; motor support brackets; and pedestal. Each drilling and tapping unit is powered by a $\frac{1}{2}$ h.p. motor mounted under the table, which is firmly supported on the 28-inch high steel pedestal.

In use, an operator inserts an aluminum bezel into the fixture, taking care that it is placed properly. The operator then locks the bezel firmly in position by pulling down the locking clamp provided on the fixture.

After a solenoid switch in each drilling and tapping unit is activated, the air cylinders build up pressure until each drill head is thrust forward simultaneously, thus causing the five drills to enter the bezel fixture drill bushings and to drill and countersink the bezel.



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The bezel fixture is made of cast iron and its drill bushings are made of hardened and ground steel. Three bushings are $17/64$ inch in diameter and two bushings are $1\frac{1}{4}$ inch in diameter. An ordinary hammer was used

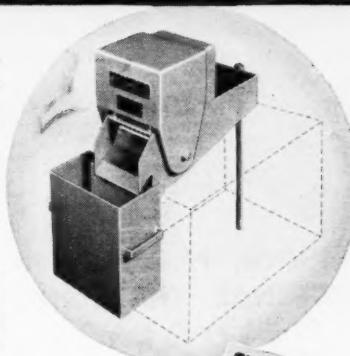
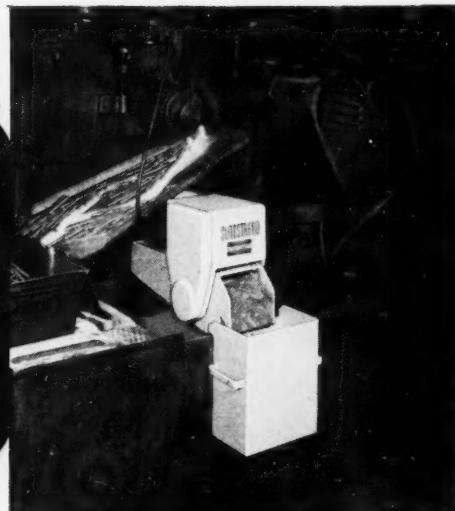
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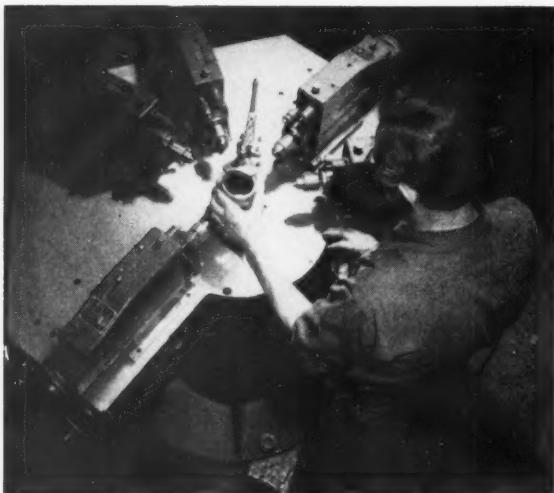
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SUNDSTRAND
Magnetic Products Co.

Division of Sundstrand Machine Tool Co.
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Drilling and tapping table used at Precision Castings Co., Inc., Fayetteville, N. Y. for drilling and tapping five holes simultaneously in aluminum bezels

chine & Tool Company jig bored not only the bezel fixture but also the hardened and ground steel locating ring which strengthens the top lip of the fixture. Both the fixture casting and the locating ring were machined on a 1½ B Pratt & Whitney jig borer and surfaced on a Gallmeyer & Livingston surface grinder. A Walker-Turner radial drill was used to drill and tap 24 holes, and to drill and counterbore 44 additional holes.

to insert the bushings into the fixture casting so as to avoid pressing them out of shape.

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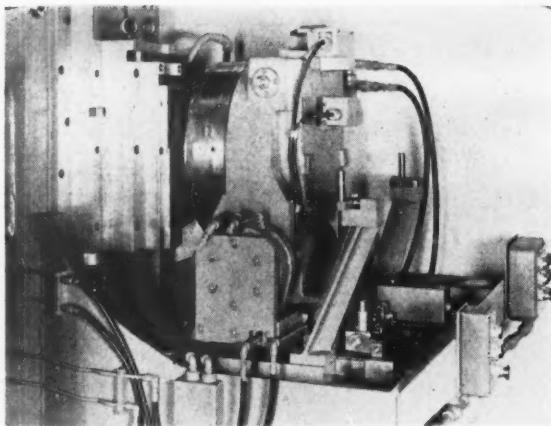
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Close-up view of broach and fixture on 6-ton Colonial single-ram broaching machine that produces "blind" slots in tank brake-applying cam rings

Mich., permits the use of a standard broaching machine for the finishing of surfaces where the broach cannot pass by the work. The machine, which is basically a Colonial 6-ton 42-inch stroke single-ram vertical broaching ma-

chine, produces 12 slots of identical shape on right and left-hand 20-inch diameter stationary brake-applying cams for army tanks. The slots are not diametrically opposite each other and thus are in effect "blind" and do

Vertical Broaching Machine Finishes "Blind" Surfaces

A unique broaching setup developed by the Colonial Broach Co., P.O. Box 37, Harper Station, Detroit 13,

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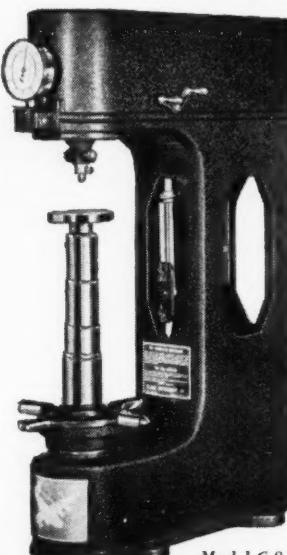
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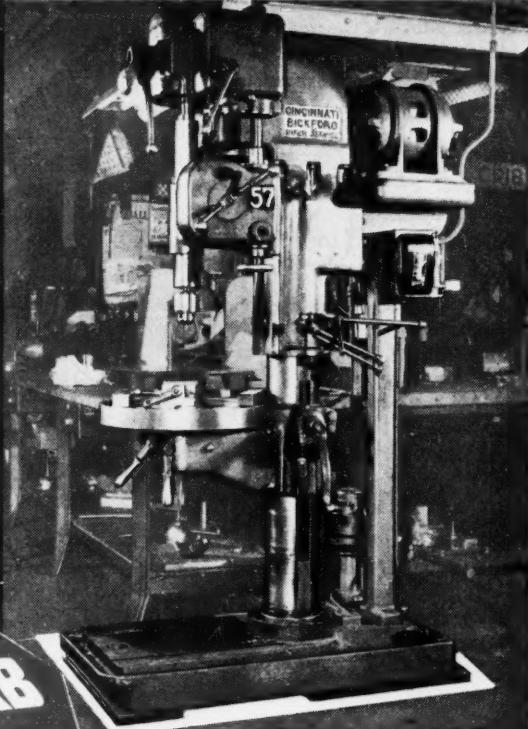


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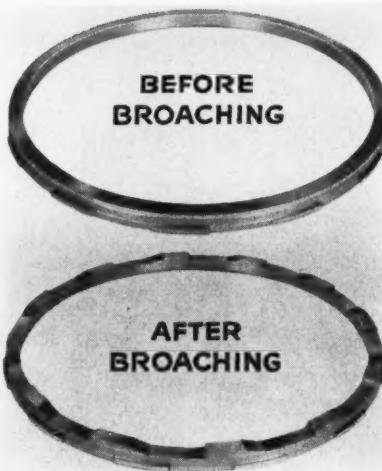
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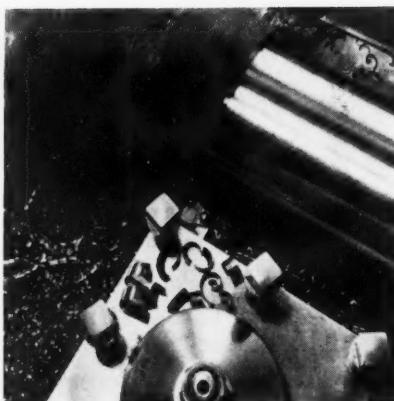


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ordnance plant was recently achieved by the use of standard cemented tungsten carbide clamped tools produced by Kennametal, Inc., Latrobe, Pa. By minimizing tool changing down time and eliminating one roughing cut, production time per tube was reduced from 3.6 hours to 1.8 hours—a 50 per cent reduction.

To turn these tough chrome-nickel forgings (Brinell 350-385), at 75 revolutions per minute and a 0.023-inch feed, formerly required two roughing cuts, a semi-finishing cut, and a finishing cut—a total of four operations on a LeBlond tracer lathe. Depth of cut on the first pass varied from $\frac{1}{4}$ to $\frac{5}{8}$ inch. This variation in depth plus relatively long cuts resulted in considerable tool breakage and tool-changing down time. Rough turning is now performed at the plant with clamped carbide tools using the same speed but a



Rough turning a 105 mm. gun tube on a LeBlond tracer lathe with Kennametal clamped carbide tool at 75 r.p.m., 185 s.f.m. (max.), and 0.027-inch feed

slightly higher feed of 0.027 inch. The clamped tools are said to practically eliminate down time due to tool breakage and also enable the gun tubes to be completely turned with only three cuts. In addition, finish turning is performed with Kennametal clamped carbide tools at 90 revolutions per minute, 130 to 210 surface feet per minute, and $\frac{1}{16}$ -inch depth of cut.

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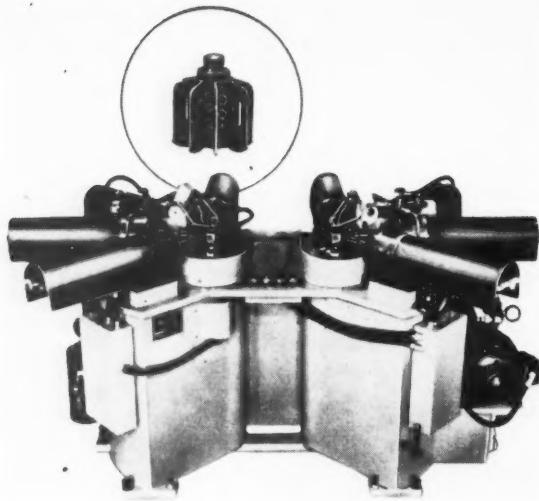
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This special two-station machine incorporating eight traversing motor shaft type drilling units is used by a shell manufacturer to speed up the production of 60 mm. mortar shell fins, as illustrated in the circular inset.

Drilling Units Speed Mortar Shell Fin Production

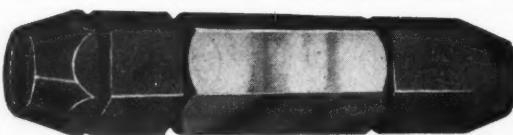
EIGHT traversing motor shaft type Black drilling units designed into a special machine built by the Bartelt Engineering Co., Rockford, Ill., are now speeding up the production of 60 mm. mortar shell fins for the Line Material Company. This unique piece of equipment is completely automatic. It is a two-station unit, employing one operator for feeding and unloading both stations at the end of each cycle.

The unit is designed to drill sixteen $\frac{1}{16}$ -inch holes in each fin (as illustrated in the circular inset), drilling the four upper holes, indexing 180 degrees, and drilling the remaining four upper holes. The work-holding spindle then raises, and the operations are automatically repeated for the eight lower holes.

With this machine, accuracy is said to be maintained and the output is claimed to have been increased from 300 to 400 fins per hour. Much of the credit for faster drilling is said to be due to the unique design of the drilling units, made by Black Drill Co., Inc., 1372 E. 222nd St., Cleveland 17, Ohio, which provides for rapid advance of the drill to the work, positive feed, and quick return of the drill after complete break-through.

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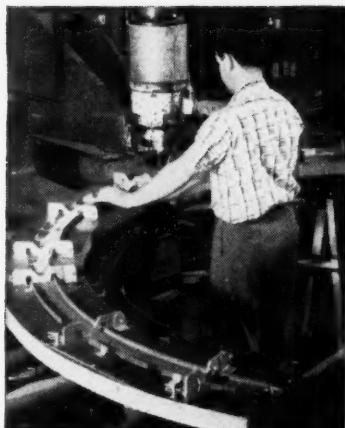
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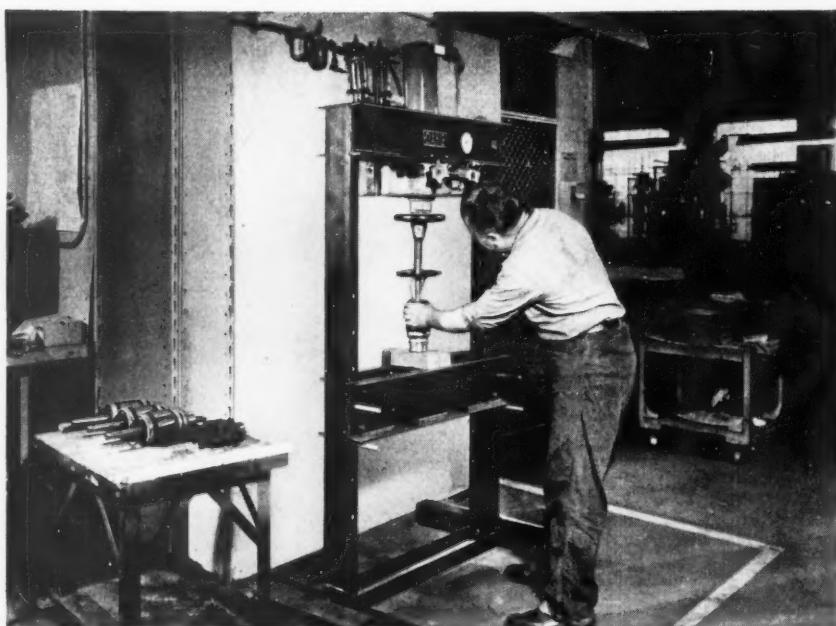
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Here is another example of the way Dake Presses bring substantial production economies.

An electric motor manufacturer has a variety of forcing, forming, bending, and straightening jobs in his plant. These are a few of them:

Pressing fans on armature shafts (see photo above)

Pressing slip rings on armature shafts

Pressing commutators on armature cores

Pressing laminations to thickness for stator frames

Pressing arches in stator frame coils

Until recently these jobs were handled in a variety of ways—mostly on a hand press. Since installing the Dake Air-Hydraulic Press, he finds there is a saving of about 15% on labor costs. He also reports that the press affords a quicker, easier way to do many jobs that formerly were handled on other equipment.

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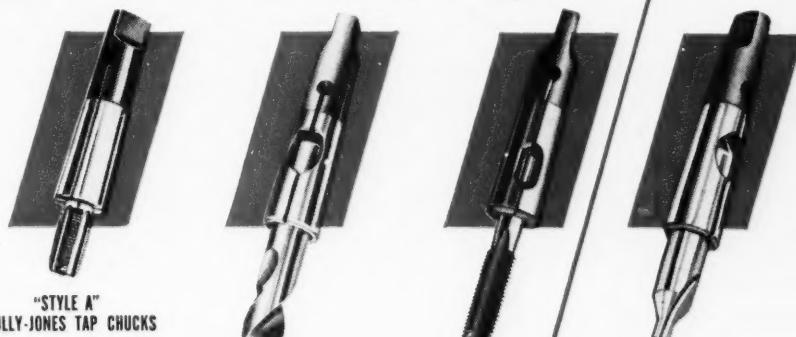
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guest editorial



Competition — The Mainspring

By CHARLES R. TYSON

President, John A. Roebling's Sons Co.

MOST of us think of politics when we speak of voting. But there is another kind of voting. We Americans vote every day. We vote for this make of shirt in preference to that one. We vote for one cigarette rather than another. We vote — and by voting, we keep competition alive.

We must never lose sight of the fact that competition is the mainspring that makes our country tick. Kill competition and you destroy the incentive that has made ours the greatest and most prosperous nation on earth. Remove incentive and you destroy this nation.

Here is the reason. When you buy a reel of wire rope from me and pay me more than it cost to make it, I make a profit. But unless that rope makes a profit for you, you won't buy my rope again. Both of us must gain or we both lose.

Today, our profit system is being undermined by people who are against competition; for the most part, because they can't hold their own in an open market. They are trying to convince us that the profit system doesn't fit into the modern world. They want to regulate and control everything we buy and sell and do.

You don't have to look far to see what would happen should they get their way. We would cease to be a democracy. We

would become something else, something in which you and I would have no voice — or choice.

Isn't it about time we stopped standing idly by while those we elected assume more and more authority and power, crowding us faster and faster in the direction of socialism?

Many of us seem to believe that socialism can't happen here, because it would mean that the State would have to take over our businesses and we could stop that before it happened. It doesn't mean anything of the sort. It merely means that the State takes over the basic functions of raw material allocation, power, fuel and transportation. Everything else can remain in private hands, operated, of course, according to plans laid out and supervised by the State's various bureaus.

You probably are familiar with that well known musical fantasy which portrays an ambitious sorcerer's apprentice taking advantage of his master's absence. By toying with things he did not understand, he started a deluge which would have destroyed him had his master not returned in time to stop the rising flood.

The modern version of this story is being enacted before our eyes today. What is worse, we are standing idly by while the rising tide of controls threatens to engulf us. Can there be any doubt in our minds about the peril threatening us?

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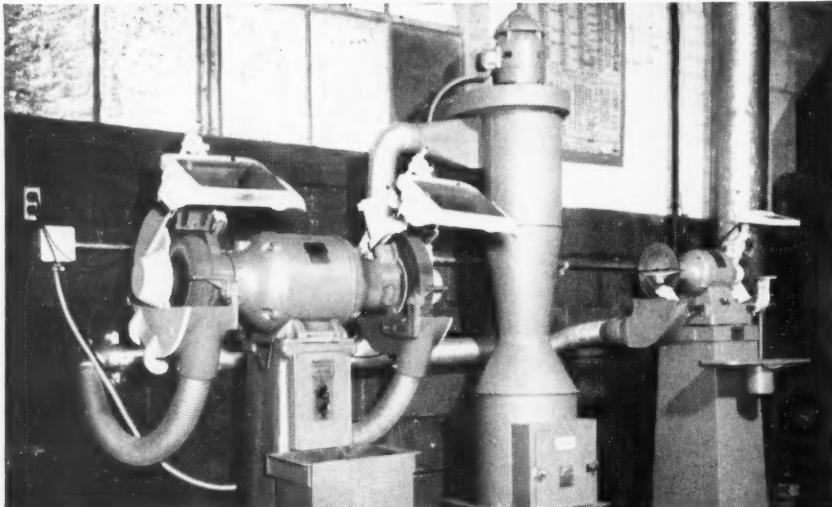
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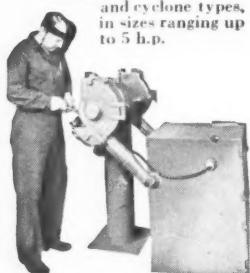
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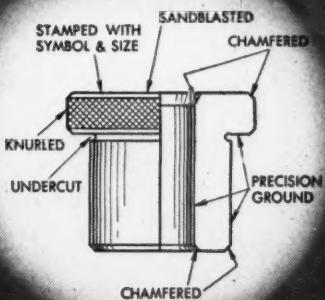
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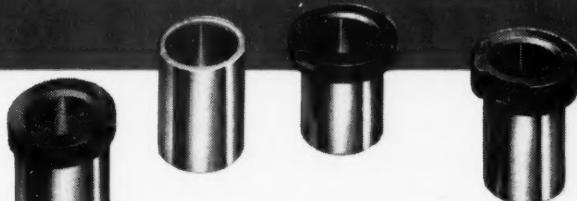
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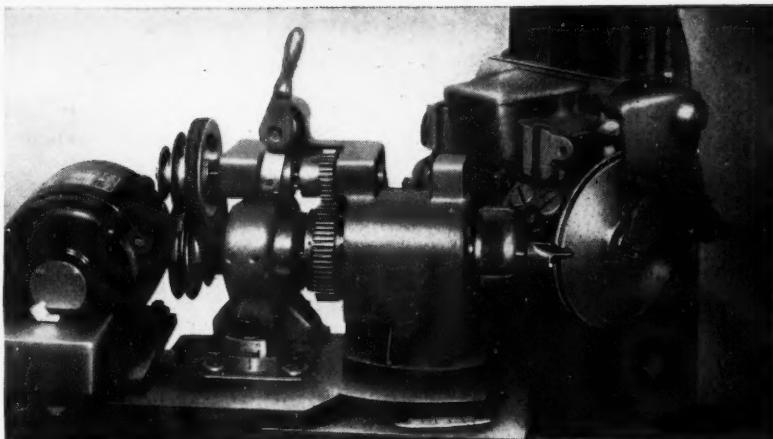
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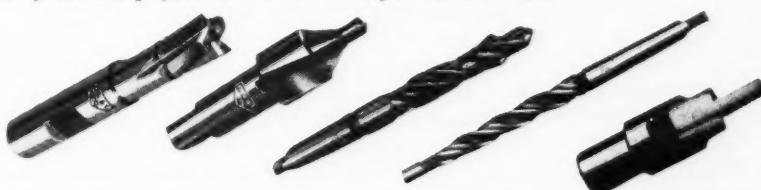
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ideas from readers

Duplex Milling Fixture

By ROBERT MAWSON

FIGURE 1 shows a sketch of a stainless steel inlet manifold heater valve shaft used on automobiles manufactured by the Studebaker Corp., South Bend, Ind. In producing this part, the shaft is first ground on all surfaces; one end is machined to a smaller diameter; and a neck is formed near the opposite end, which is also provided with a 30-degree bevel taper. The next operation on the part consists of cutting a 0.030-0.040-inch slot for a depth of $\frac{1}{16}$ inch in the necked end of the piece. The fixture used in performing this operation is shown in Fig. 2.

The base of the fixture is constructed from the following machine steel sections: one $1 \times 4\frac{1}{2} \times 7\frac{3}{8}$ -inch section,

two $\frac{3}{8} \times 2 \times 3\frac{1}{4}$ -inch sections, one $\frac{3}{8} \times 1\frac{1}{2} \times 2\frac{1}{8}$ -inch section, and one $\frac{3}{4} \times 4 \times 4\frac{3}{8}$ -inch section. These sections are then welded to form the base, A, and then finish machined. In the bottom surface of the base a 0.625-inch slot is machined for a depth of $\frac{3}{16}$ inch into which is fastened two machine steel keys, B, each with a socket head cap screw, C. Two $\frac{1}{2}$ -inch holes are also drilled and reamed in the base and then spot-faced to a size $\frac{11}{16}$ inch in diameter $\times \frac{1}{16}$ inch deep. Into each of these holes is driven a hardened and ground tool steel rest pin, D.

In the vertical section of the base a $17/32$ -inch hole is drilled and then reamed $\frac{3}{4}$ inch for a depth of $\frac{7}{8}$ inch. Aligned with this hole is a $\frac{3}{4}$ -inch reamed hole in the machine steel work-positioning plate, E, which is attached to the base by two $\frac{3}{8}$ -inch steel dowels, F, and four $\frac{3}{8}$ -inch socket head cap screws, G. The plate is machined with

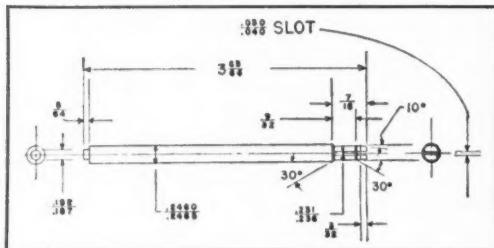


Fig. 1—Sketch of stainless steel inlet manifold heater valve shaft slotted with the aid of the fixture shown in Fig. 2.

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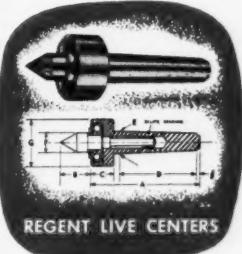
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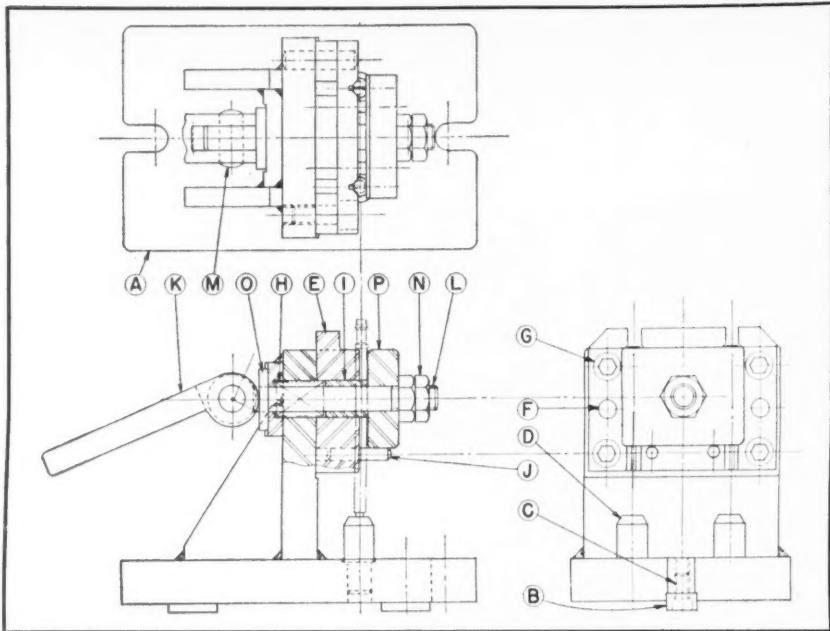


Fig. 2—Duplex milling fixture used in slotting inlet manifold heater valve shafts of the type shown in Fig. 1.

two 45-degree notches in which the workpieces rest. After the plate has been fastened in position, a tension spring, **H**, is placed in the $\frac{3}{4}$ -inch reamed hole of the fixture base and plate.

A steel bushing, **I**, is next placed in

the plate, the bushing being machined to provide a close-sliding fit in the $\frac{3}{4}$ -inch reamed hole in the plate, which also includes two additional holes for two $\frac{1}{4}$ -inch dowel pins, **J**, that are driven into the plate so as to project as shown in the sketch. The steel hold-

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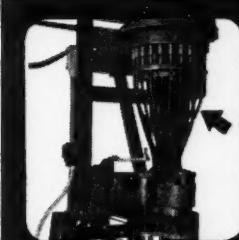
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ing cam lever **K** has a forked end into which a threaded eye bolt, **L**, is inserted and held by means of a steel pin, **M**, fitted through reamed holes in the lever and eye bolt. The lever is free to pivot on the pin; the eye bolt is retained in the fixture by two steel hexagonal nuts, **N**. When placing the assembled eye bolt and cam lever in the fixture, a hardened steel washer, **O**, is located at the left-hand end of the eye bolt. At the right-hand end of the eye bolt and

resting on the pins **J** is a square steel plate, **P**.

To perform the slotting operation on the workpiece shown in Fig. 1, the fixture is properly positioned on the table of a hand miller by placing the keys **B** in a slot in the table. Nuts on two T-head bolts fitting the table slot and passing through the openings at each end of the fixture base are then tightened to hold the fixture firmly in place. Two milling cutters of the correct width and proper spacing are placed on an arbor and held in the machine head in the conventional manner. The table is also properly adjusted to provide the correct depth of cut in milling the slot in the work. Two inlet manifold heater valve shafts are then inserted in the fixture and located for height by resting on the pins **D**. The cam lever **K** is next operated in a downward direction, thus drawing in the plate **P** so that the two workpieces are held firmly in the fixture. The machine can then be started in motion and, by feeding the table and fix-

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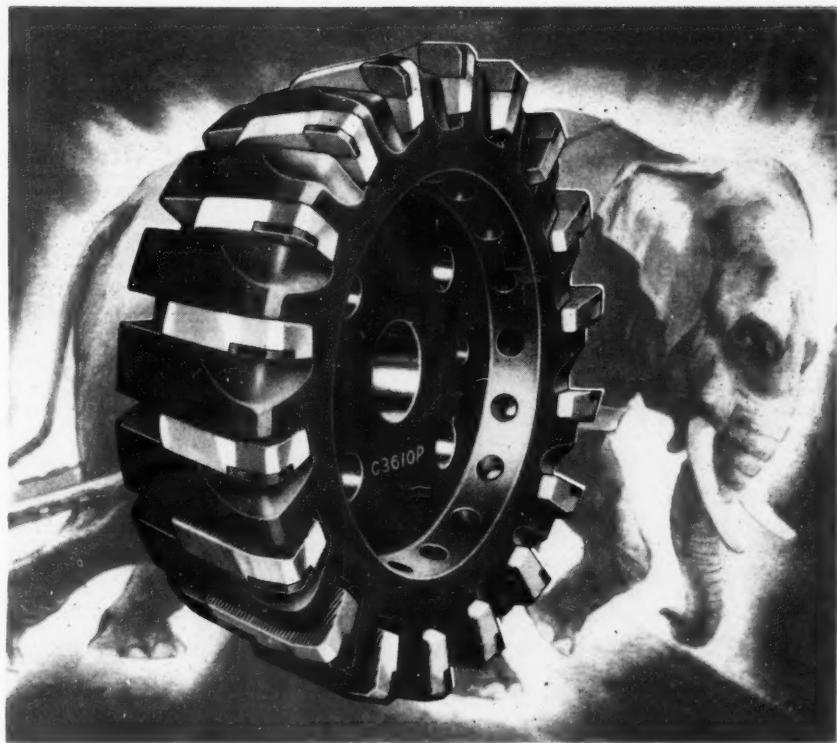
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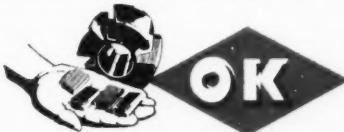


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ture toward the revolving cutters, slots are milled in the two workpieces. After the slots have been milled, the table and fixture are withdrawn from the machining zone.

To remove the milled pieces, the cam lever **K** is raised, thus allowing the spring **H** to force back the plate **P** so that the workpieces can be lifted out of the fixture.

Hardened Jaw Insert Improves Chucking Conditions

By H. G. FROMMER

IN the performance of turret lathe operations, we have discovered that the chucking of workpieces is sometimes unsatisfactorily accomplished when using regular hardened jaws or special-made soft jaws. We have found

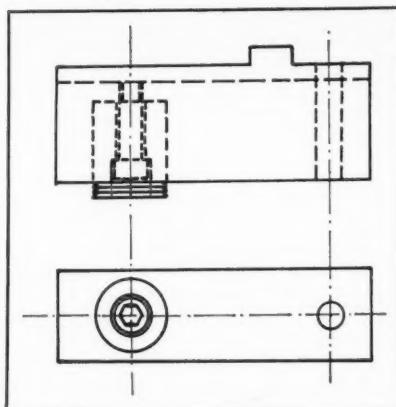


Fig. 1—Sketch of standard soft chuck jaw with hardened jaw insert

this to be especially true where the clamping surfaces of castings are extremely narrow, since hardened jaws, in many instances, do not provide the

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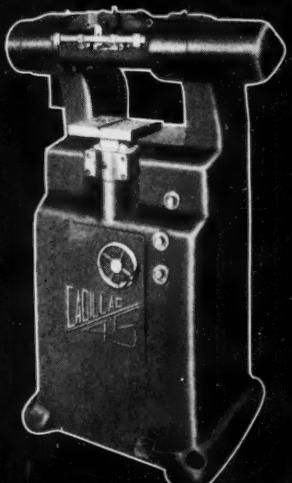
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necessary qualities unless they are resharpened frequently. In addition, when casting "draft" is present on chucking surfaces, we notice that standard jaws tend to force the workpiece away and out, thereby causing runout and unsafe working conditions. To make such jaws grip tightly, we have to grind them at a taper. This operation is time-consuming and consequently ties up a production machine.

To eliminate these difficulties, a hardened, round insert, as shown in Figs. 1 and 2, can be made for standard soft jaws. The jaw is bored out to the largest diameter permitted by its width. The bore is terminated near the bottom surface of the jaw, and a tapped hole, concentric with the bore, is provided through the remaining

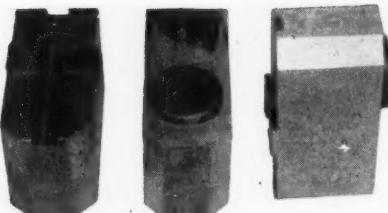


Fig. 2—A bottom view of a standard soft chuck jaw is shown at the left, while the view in the center shows the same type of jaw fitted with a hardened replaceable insert. The view on the right shows a jaw with insert in a side position.

wall. Into this hole is fitted a hardened tool steel sleeve which, in turn, is bored out to accommodate a socket head cap screw. This screw serves to fasten the sleeve to the jaw. The top of the sleeve is provided with circular half-vee grooves to force the workpiece backward against the jaw body.

The main advantages that are said to be afforded by this type of jaw insert are: (1) a very hard gripping surface, (2) a gripping surface which can be tapered easily or shaped otherwise to conform with the workpiece outline, (3) elimination of jaw sharpening and consequent loss of operator's time as the insert can be loosened and rotated slightly to present a new, sharp gripping edge, (4) adjustable width of gripping surface with help of washers inserted beneath the insert, and (5) relative low cost of replacement.

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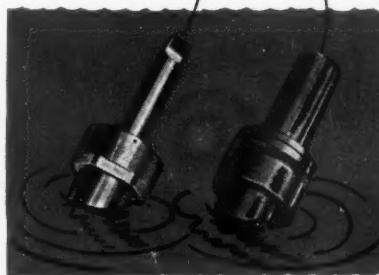
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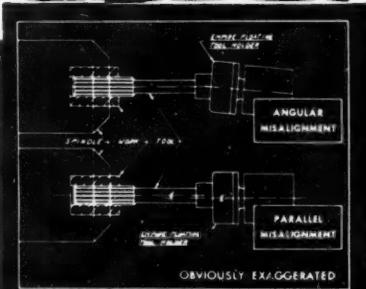
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Hydraulic Tool Aids Metal Spinning

By GILBERT C. CLOSE

IN metal spinning work, the production of heavy spun parts has always incurred considerable operator effort to "flow" the metal against the spinning chuck. Even with the extreme leverage provided by the compound spinning tool shown in Fig. 1, the ef-

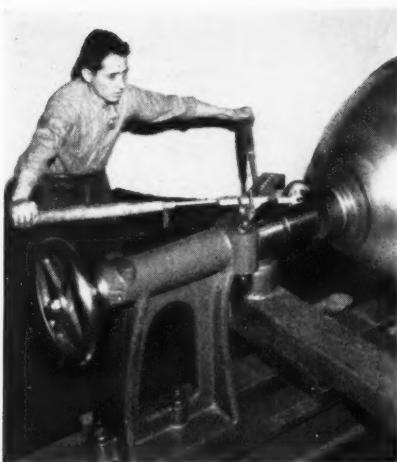


Fig. 1—Operator is shown using a compound spinning tool to provide extreme leverage in "flowing" the metal against the spinning chuck with consequent loss of necessary "feel."

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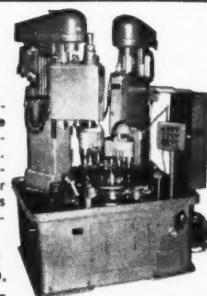
fort expended was often at the expense of the sensitive "feel" so necessary to good spinning work.

To overcome this disadvantage, the Methods Development Engineering group at the El Segundo Division of Douglas Aircraft Company, under the direction of H. W. Snook, designed and built the hydraulically operated spinning tool shown in Fig. 2. A hydraulic cylinder in the tool shank, which can be operated at up to 3,000 p.s.i. pres-

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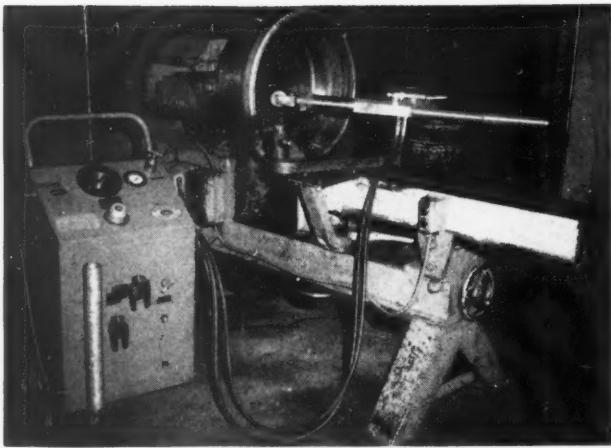


Fig. 2—This illustration shows a hydraulically operated spinning tool built by the El Segundo Division of Douglas Aircraft Company to provide high pressure for "flowing" the metal against the spinning chuck without loss of "feel."

sure, provides all the necessary forward pressure on the tool head.

The tool is shown in use in Fig. 3. The valve under the operator's right

thumb is used to increase or decrease spinning pressures as required. Short coupling of the tool at a fulcrum near the spinning head permits the operator to apply lateral control with a minimum of effort. Most important, due to the easily manipulated valve for

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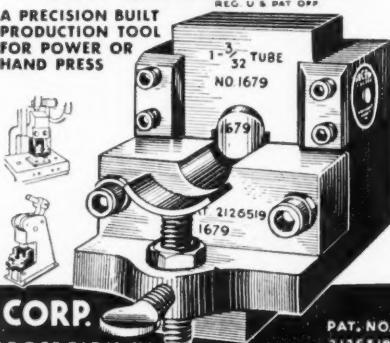
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Fig. 3—A heavy gauge steel pan section is shown being spun into a female chuck with the aid of the El Segundo-built hydraulically operated spinning tool.

adjusting spinning pressures, the tool retains the necessary "feel" of metal flow to facilitate good work.

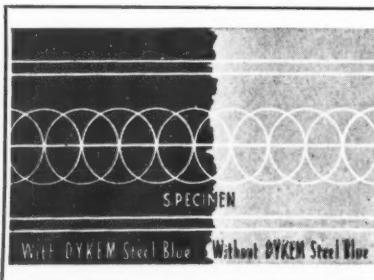
Efficient Method for Starting a Hand Tap

By F. E. RILEY
England

A SATISFACTORY method which we have found for starting a hand tap in a drilled hole is to utilize the spindle of the drill press for guiding the tap in a straight line while turning the tap by means of a hand wrench. Since the tap shank must be gripped

in the chuck for guiding purposes, the flats to accommodate the tap wrench are enclosed within the body of the chuck and cannot be used. By grinding a single driving flat just above the thread on the tap and using a special wrench for engaging with this flat, the tap shank can be held in the drill chuck for guiding and the tap may be rotated by means of the wrench.

Referring to the accompanying sketch, the letter **A** is used to designate the single flat ground on the shank, **B**, of the tap, a substantial portion of which is still available for gripping in the chuck. The wrench, **C**, which is simple to make, includes a flat section, **D**, in which is cut a V-shaped slot that will accommodate tap shanks between $\frac{1}{4}$ and $\frac{1}{2}$ inch in diameter. The flat **A** on the tap is forced into contact with one straight side of the vee by means of a screw, **E**, the end



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5	30-32-36-48-80		30-32-36-40	1-5/8	5 1/2-8-10-12-13-16-18-
6	36-40-48-56-60	1/2	12-14-16-18-22-24-26-	20-24	20-24
7	32-40		27-28-30-32-40	1-11/16	10-12-14-16-18-20-24
8	24-30-36-38-40-44-48	9/16	16-20-24-27-28-30-32-	1-3/4	8-10-12-14-16-18-20-24
9	24-28-32-40		40-48	1-13/16	8-10-12-14-16-18-20
10	28-30-36-40-48-64	5/8	12-14-16-20-24-27-28-	1-7/8	8-10-12-14-16-18-20-24
12	20-28-32-36		32-36-40	1-15/16	8-10-12-14-16-18-20-24
14	20-24-28	11/16	11-16-18-20-24-27-28-	28	28
1/16	60-64		30-32	2	4 1/2-8-10-12-16-18-20
5/64	72	3/4	9-11-12-14-18-20-24-	2-1/16	12-14
3/32	48		26-27-28-32	2-1/8	12-16-20
7/64	48-56	13/16	10-14-18-20-32	2-3/16	12-16
1/8	32-40	7/8	10-12-16-18-20-24-27-	2-1/4	4 1/2-8-12-14-16-18
5/32	32-36-40	15/16	28-32	2-5/16	12-18
9/64	36-40		8-9-10-12-14-16-18-	2-3/8	12-16-18
11/64	36	1	20-24-32	2-1/2	8-10-12
3/16	20-24-32	1-1/16	10-12-16-18-20-24-27-	2-9/16	18
13/64	32		32-40	2-5/8	12-16-20
7/32	24-28-32	1-1/8	12-14-16-18-20-24-32	2-3/4	16
1/4	18-24-26-27-30-32-	1-3/16	8-10-12-14-16-18-20-24	2-7/8	8-12-16
	36-40	1-1/4	8-10-14-16-18-20-24-32	3	8-16
5/16	16-20-22-27-28-32-40	1-5/16	12-14-16-18-20-24-32	3-1/4	8-12-16
3/8	12-16-18-20-27-28-32-	1-3/8	8-10-14-16-18-20-24	3-1/2	8-12-16
	36-40-48	1-7/16	8-10-12-16-18-20-24	3-7/8	6
		1-1/2	8-10-14-16-18-20-24-28	4	8-12

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1	56-64-72	7/16	14-20-28	1-7/16	8-10-12-14-16-18-20
2	56-64	1/2	12-13-20-28	1-1/2	6-8-10-12-16-18-20
3	56	9/16	12-18-20-24	1-9/16	8-10-12-16-18-20
4	32-36-40-48	5/8	11-12-18-20-24	1-5/8	8-10-12-14-16-18-20
5	40-44	11/16	11-16-24	1-11/16	8-10-12-14-16-18-20
6	32-36-40	3/4	10-16-18-20	1-3/4	8-10-12-14-16-18-20
8	32-36-40	13/16	16	1-13/16	8-10-12-14-16-18-20
10	24-30-32-40	7/8	9-12-14-18-20	1-7/8	8-10-12-14-16-18-20
12	24-28-32	1	8-12-14-16-18-20	1-15/16	8-10-12-14-16-18-20
1/4	20-28-32	1-1/8	7-12	2	4 1/2-10-12
5/16	18-20-24-28-32	1-1/4	7-12-16-18		

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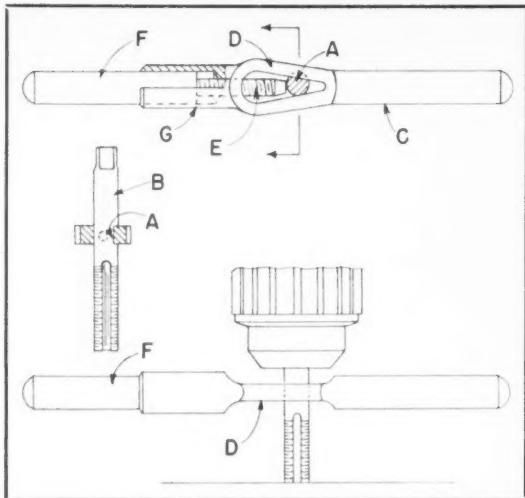
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Sketch showing method for starting a hand tap in a drilled hole

sleeve portion, G, of the wrench body. The section of the wrench body around the vee is heat treated to resist wear.

In use, the drill is removed from the chuck and the wrench is tightened onto the tap, which is then gripped in the drill chuck and fed down into the drilled hole. It is a simple matter to rotate the tap with one hand while maintaining axial pressure on the

tap so that it makes a clean start. When a full thread has been cut, the chuck may be released and the wrench turned to finish threading the hole.

of which is tapered to the same included angle as that between the sides of the vee. The screw is provided with a handle, F, which is supported by the



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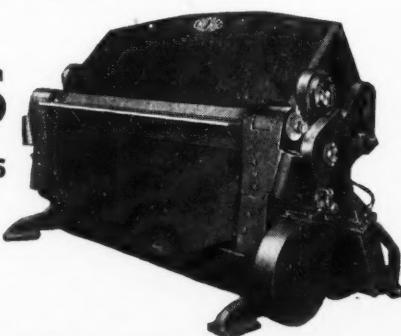
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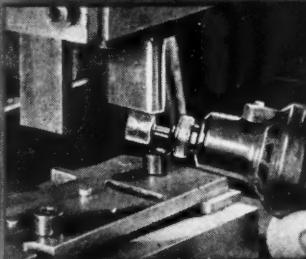
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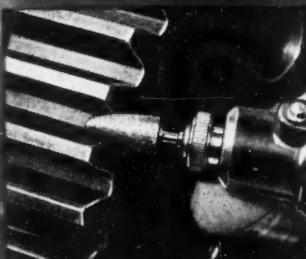
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Dremel Moto-Tools are time tested—have been widely used in industry for over fifteen years. A veteran of World War II, Moto-Tool served in war plants and at military maintenance bases throughout the world. Thousands of these mighty midgets helped to make the atomic bomb—were used to establish production records in defense industries during the last war. Hundreds of toolroom and production line operations, such as polishing and grinding dies, burring parts, marking tools, sharpening cutters, touch up jobs, etc. are accomplished in seconds, without tearing down "set-ups." Moto-Tool is sturdily constructed for long lasting industrial service. Weighs only 13 oz.—dynamically balanced for vibrationless operation.



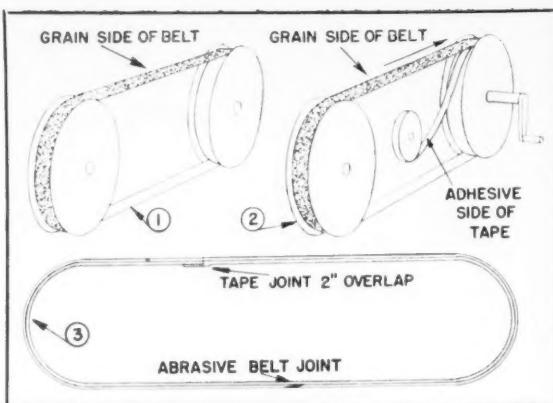
MOTO - TOOL KIT
NO. 2 contains 23
accessories, includ-
ing high-speed steel
cutters and Model 2
Moto-Tool in natu-
ral finish hardwood
case \$23.50

MOTO - TOOL NO. 2,
with one emery wheel
point \$16.50

Dremel HIGH - SPEED STEEL
CUTTERS and balanced wheel
points are available for all
makes of hand grinding tools.

WRITE FOR INDUSTRIAL CATALOG

DREMEL MFG. CO. Dept. 222-L RACINE, WIS. U.S.A.



(1) Place the abrasive coated belt over two flanged pulleys on which the grooves are the same width as the belt. Hold the pulleys apart to keep a tension on the belt. (2) Mount a roll of strapping tape on a spindle between the pulleys. Attach the lead end of the tape to the underside of the belt and rotate the belt and pulleys as shown. (3) Start the tape on the belt at the point most distant from the belt joint. When the belt is fully lined, cut the tape at a point that will allow about two inches overlap.

Reinforcement with Tape Strengthens Abrasive Belt

By B. G. LAWRENCE

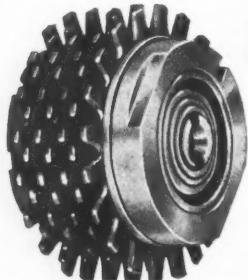
WHERE abrasive belts are to be subjected to excessive loads, they may be strengthened quickly and inex-

pensively with a backing of pressure-sensitive Fiberglas-reinforced strapping tape. Investigation by the Product Engineering Department of Behr-Manning Corp., Troy, N. Y., indicates that this simple modification may often permit the use of these belts for fast removal of metal and in finishing operations formerly consider-

HANCHETT METCALF WHEEL DRESSERS

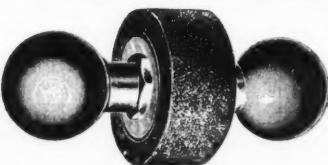
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Balanced . . . Free Running . . . High Speed Crushing and Wheel Forming Action . . . For SHARP, CLEAN, OPEN WHEEL FACES



MODEL 1943 CC
ASSEMBLY

STEEL CUTTERS
For Surface
Grinders, etc.



Complete
Assembly \$ 7.50
Extra Wheel \$1.35

Made by the World's Largest Manufacturers of
**SAW SHARPENING and
KNIFE GRINDING MACHINERY**

HANCHETT MANUFACTURING CO.

BIG RAPIDS, MICH.

MM-112

PORTLAND 4, ORE.

..... in the
"JET PROGRAM"—its **WOODWORTH**
FOR PRECISION CHUCKING

No. 2 IN A SERIES

IN A SERIES		PART NAME:	PART NO. 220161				
DATE	OPERATOR		OPER. NO.	TIME			
		OPER. NAME: GRIND ID & FACE TRUE WITH O.D.	150				
BY	APPN:	DESCRIPTION OF OPERATION AND SKETCH	INT. GRINDER	REAR			
TOOLS AND GAGES				FWD			
<p>WOODWORTH 35 1/2 INCH DIAFRAGM CHUCK</p> <p>LOCATE STOP</p> <p>STOP</p> <p>32.901 DIA 32.699</p> <p>30.869 DIA 30.870</p> <p>231 230</p>							
<p>NOTE: <u>ID & OD MUST BE CONCENTRIC</u> <u>WITHIN .0005 TIR & SQUARE</u> <u>WITH FACES WITHIN .0005 PER INCH</u></p>							
<p>CALIBRATED</p> <table border="1"> <tr> <td>CMM</td> <td>WAD</td> <td>DATE 000</td> </tr> </table>					CMM	WAD	DATE 000
CMM	WAD	DATE 000					

The aircraft, automotive and associated fields recognize Woodworth as "headquarters" for the best precision chucking. So for the best solution to your precision chucking problems... send part print and machining information to Woodworth.



Accuracy you can trust

WOODWORTH

N. A. WOODWORTH CO., 1300 EAST NINE MILE ROAD • DETROIT 20, MICHIGAN
PRECISION GAGES • DIAPHRAGM CHUCKS AND ARBORS • CONE-LOK JIGS

ed too severe for commercial equipment of this type.

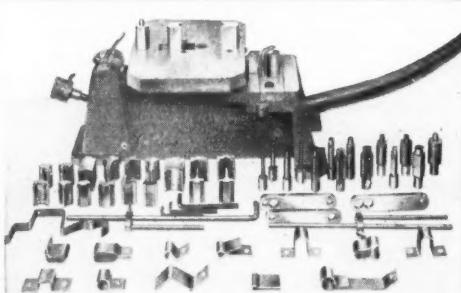
Reinforcement is accomplished by lining the cloth side of the belt with a lamination of the pressure-sensitive tape. As shown in the accompanying sketch a simple arrangement of pulleys can be set up to expedite the job. Two pulleys are mounted in tandem, and the belt to be reinforced is placed over them. A roll of strapping tape is then mounted on a spindle between the pulleys, and the lead end of the tape is attached to the underside of the belt. By rotating the belt, the tape will be drawn from the roll and pressed to the back of the belt as it passes over the first pulley.

In addition to increasing the tensile

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3525 Cardiff Ave., Cincinnati 9, Ohio



Multiform

BENDER CUTTER

BENDER CUTTER
Users report the Multiform Bender one of the handiest tools in the shop. No special tooling . . . Bends, Cuts, Punches, Flats, Rounds Into Any Shape, Clamps, Brackets, Springs, Busbars, Wire Forms, Aircraft Work, Steel Rule Dies, Etc.

**AIR OR HAND MODELS FOR UP TO
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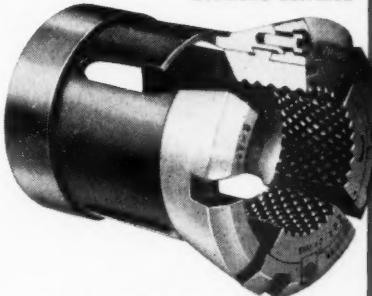
Write for brochure which illustrates
and describes the four bender models.

J. A. RICHARDS CO.
Dept. 6 M Kalamazoo, Mich.

*Be a
Quick Change
Artist! —*



"Only Sutton Collets are
Diamond Serrated"



TRUE AS THE SPINDLE

Change pads
without removing collet
from machine.

Handles all sizes and
shapes of stock within
capacity.

Pads are securely locked by
a greater holding mechanism to prevent
slippage from bar thrust.

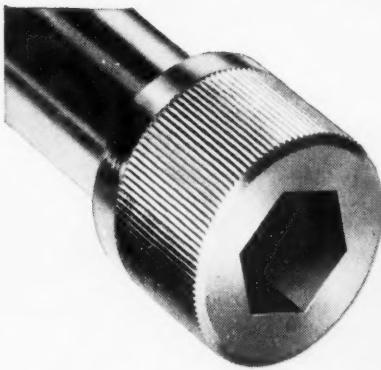
OTHER SUTTON MASTER COLLETS

- *Full Floating* for handling hot rolled stock in automatic screw machines
- *Standard* for all automatic and hand machines

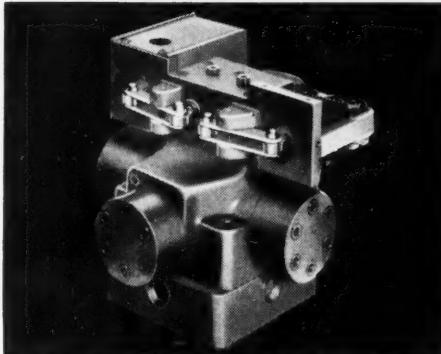
MMS-11 Sutton Tool Company, Sturgis, Michigan

SUTTON  **COLLETS**





3000 psi., 4-way valve illustrating flush surface installation of UNBRAKO Cap Screws



UNBRAKO CAP SCREWS

PRECISION FINISH ADDS SALES APPEAL TO YOUR PRODUCT

Every spring, washer, nut and bolt is equally important to your product, but it's the finish that attracts attention, arouses interest, and creates a desire for it.

SPS makes its products to help you sell your products. Our threaded industrial fasteners—UNBRAKO Socket Screw Products—have the clean, precision finish to give your product added eye appeal; the uniform accuracy and strength to give it added sales appeal.

Take advantage of SPS Fastener Engineering. Let the experience and know-how of more than 40 years help you sell your product. STANDARD PRESSED STEEL Co., Jenkintown 22, Pennsylvania.

UNBRAKO

SOCKET SCREW DIVISION

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JENKINTOWN PENNSYLVANIA

CAP SCREWS • SET SCREWS • SHOULDER SCREWS • DOWEL PINS • PRESSURE PLUGS

news of the industry

600 Classes Completed In Carboloy's Customer Training School

Six hundred classes were recently completed in Carboloy's Customer Training School which began 11 years ago to explain, in detail, the uses of the then comparatively new carbides to members of the metal industry. More than 5,400 men and women in supervisory positions from approximately 1,400 different companies have taken the five-day course in the plant of the Carboloy Department of General Electric Co., Detroit, Mich. The students came from 40 states and 13 foreign nations to attend

the school. Carboloy also maintains a standing policy of inviting all its distributors to attend the school as part of its program to keep them abreast of all carbide developments.

The school operates two types of cutting tool courses—basic and advanced. The advanced course includes such subjects as induction brazing, boring tool design, grinding of boring tools, grinding single point tools, roller turner tool design, grinding roller turner tools and chipbreakers, and a discussion on the theory of metal cutting.

In addition to the cutting tool courses, five-day sessions are also presented in cemented carbide dies. Individualstaking this training may concentrate on one of three fields.



Raymond Moessner, Carboloy, shows students how to braze a carbide tip on a shank in the 600th session of the Customer Training School.

WHY LENOX HACKMASTER USERS ARE—

*Sitting
on top of
the World!*



ECONOMY

Do not break — no loss from breakage of partially worn blades.

DURABILITY

Made of High Speed Steel that will outlast several standard grade blades.

SAFETY

Will not shatter in use. No bruised hands or other accidents.

High Speed Steel
★ Unbreakable

lenox Hackmaster
"A DIFFERENT HAND
HACK SAW BLADE"

AMERICAN SAW & MFG. COMPANY • ST. LOUIS, MISSOURI
BAND SAWS • FLAT GROUND STOCK • TOOL BITS

Lindberg Purchases Western Acreage

Lindberg Engineering Co., 2469 W. Hubbard St., Chicago 12, Ill., manufacturer of industrial heat-treating furnaces and supplies, has announced the purchase of $4\frac{1}{2}$ acres of land in Los Angeles. The company plans to build a plant and offices for the manufacture of its heat-treating and melting furnaces as soon as possible. Complete

manufacturing equipment will include a railroad siding and cranes for loading and unloading heavy units.

Industrial Bench Acquires Equipment of New Britain Machine's Shop Furniture Division

The Industrial Bench & Equipment Mfg. Co., New Britain, Conn., formerly a division of Brunette Tool Company, Inc., has acquired all the tools, dies, drawings, and machinery of the New Britain Machine Company's Shop Furniture Division, New Britain. Industrial Bench has announced that its new, modern plant located at 89 South St., New Britain, is in operation, producing a complete line of steel benches, steel benches with maple tops, steel work stands, steel bench legs, steel tote boxes, welding benches, and so on. Special engineering facilities are being organized to assist plants and their personnel to maximize efficient plant layout by a suitable arrangement of proper

Speed-up DRILL PRESS OPERATIONS

Grip-Master SCREWLESS DRILL PRESS VISE

WITH THE HEINRICH

DRILL PRESS VISE
SCREWLESS VISE

Ask your dealer for demonstration or write for details.

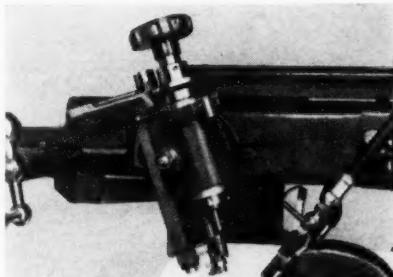
NATIONAL MACHINE TOOL CO.
DEPT. 112-L
RACINE, WISCONSIN

How To Get Better Results From Spiral Point Taps

Although spiral point taps are preferred for many operations, their use often presents sharpening problems. In fact, many manufacturers have purposely neglected to use spiral points because of the difficulty of sharpening them as accurately as required.

PRECISION SHARPENING OFFERS SOLUTION

A proven method of precision tap sharpening now enables manufacturers to enjoy the benefits of spiral point taps without sharpening difficulties. This sharpening method involves the use of the Blake Flute Grinder and Blake Chamfer Grinder. It enables each spiral point tap to be ground uniformly to the accuracy required for efficient and productive operation. Each tap can be sharpened precisely to provide uniform depth, uniform length, and uniform indexing. The superior sharpening results obtained from Blake tap sharpening equipment make possible far greater production per tap; longer tap life, and greatly reduced tap breakage.



REQUIREMENTS FOR PRECISION SHARPENING!

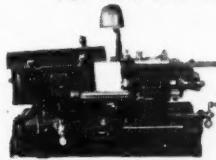
Photograph shows workhead of Blake Flute Grinder in correct angle position for accurate grinding of spiral point taps.

MORE FACTS IN TRADE PAPER ARTICLE

For a more thorough treatment of this subject, read the recent *Machinery* article, "Why Taps Should Be Sharpened Precisely". If you would like a reprint of this article for future reference, write us for your free copy. Illustrated bulletins which describe both Blake machines are also available. Ask for them!

IT'S A FACT! YOU CAN REDUCE YOUR TAP COSTS 50 to 75% by installing Blake tap sharpening equipment and sharpening your taps as you do other metal cutting tools.

PUT THIS COST-CUTTING COMBINATION TO WORK FOR YOU NOW!



BLAKE CHAMFER GRINDER
(Described in Bulletin 551)



BLAKE FLUTE GRINDER
(Described in Bulletin 651)

=

ACCURATE, TRUE-CUTTING TAPS

LESS TAP BREAKAGE

600% MORE PRODUCTION PER TAP

UP TO 75% REDUCTION IN TAP COSTS

Write for details about both machines!

EDWARD BLAKE COMPANY 438 CHERRY ST., WEST NEWTON 65
MASSACHUSETTS
BLACK DIAMOND PRECISION DRILL GRINDERS...
WALTHAM CUTTER SHARPENERS...SURFACE FINISH STANDARDS

benches and work stands. Distributorships for the company are being established throughout the country.

Pivot Punch Adds Machine Repair and Rebuilding Service

As the fifth expansion in two years, Pivot Punch & Die Corp., North Tonawanda, N. Y., recently purchased a 17-acre tract of land on which was immediately constructed a building to be

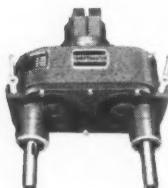
used primarily for the repair and rebuilding of machine tools. Edward Huntzinger, works manager, supervised the construction of the new plant which was in operation within nine weeks after it was staked out.

Norgren Acquires Rights of Heco Air Gun

Manufacturing and selling rights of the Heco "Flex-Tip" Air Blow Gun

have been acquired by C. A. Norgren Co., Englewood, Colo., from Hecke-thorne Mfg. & Supply Co., Littleton. In the arrangements, Norgren also obtained use of the "Flex-Tip" trade mark and will manufacture and market the item as the Norgren "Flex-Tip" Air Blow Gun. Norgren now has a complete line of air blow guns, including flex, button, and lever types, which supplements its line of oil fog lubricators, pressure regulators, air filters, relief valves, and other air controls as well as a wide variety of hose couplings and assemblies.

Yes! THIRTYMASTER makes ALL TYPES of DRILLHEADS

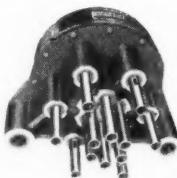


Universal Joint Drillhead . . . Full Ball or Bronze Bearing Construction. Standard and Heavy Duty. From $\frac{1}{2}$ " Minimum Centers up. Capacities to 1" in Steel.

Gear Driven Eccentric Type Adjustable Drillhead . . . Enclosed, Full Ball Bearing Construction.

Special Fixed Center Drillhead . . . Full Ball Bearing Construction.

- We Stock or Can Build the Right Drillhead for Your Job.
- Write for Complete THIRTYMASTER Catalog or phone for a rush, on-the-spot, quote.



Subsidiary of
Thomson Industries, Inc.

THIRTYMASTER Products Corporation



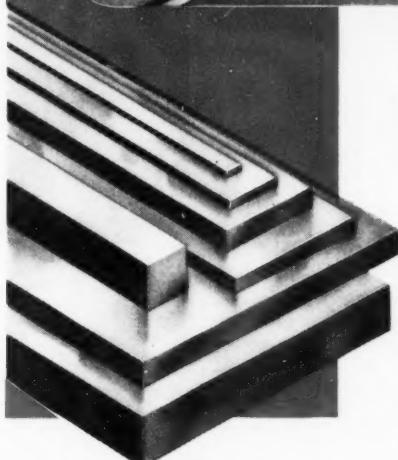
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Lancaster, Pennsylvania

Also Makers of DORMAN AUTOMATIC REVERSE TAPPERS

*Take Your
Pick!*

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OIL HARDENING



SIMONDS
SAW AND STEEL CO.

FITCHBURG, MASS.

Factory Branches in Boston, Chicago, San Francisco and Portland, Oregon.
Canadian Factors in Montreal, Que.
Southern Service Shop in Meridian, Miss. (formerly J. H. Miner Saw Mfg. Co.).
Simonds Divisions: Simonds Steel Mill, Lackawanna, N. Y.;
Simonds Abrasives Co., Philadelphia, Pa. and Arvida, Que., Canada

SIMONDS Now Makes Both Types of Flat Ground **DIE STEEL**

Simonds offers you a choice of OIL or AIR Hardening DIE STEEL, whichever is best suited to your requirements. Both types are made from Simonds own steel, are precision ground to a thickness limit of plus or minus .001" and have an extra smooth surface finish of 25 to 35 micro inches. Edges and ends are square and parallel, with all scale, decarburization and surface defects removed. All sizes come individually packaged with heat treating instructions.

SIMONDS AIR HARDENING DIE STEEL

(non-deforming 5% Chrome Type) is spherodize annealed for good machinability and uniform hardenability. Its wide hardening range (1700° to 1800° F.) makes it practically foolproof in heat-treating. Stock sizes run from $\frac{1}{2}$ " to 2" thick and 2" to 10" wide in 36" lengths.

SIMONDS OIL HARDENING DIE STEEL

(non-deforming Molybdenum Type) is uniformly annealed for easy machining and uniform hardening. Due to its wide hardening range (1450° to 1540°) good results are assured with even the simplest heat treating equipment. Stock sizes are available from $\frac{1}{4}$ " to 3" thick and $\frac{3}{8}$ " to 14" wide in 18" lengths. The heavier sizes also come in 36" lengths.

Try a bar on your next job. Your Simonds Distributor carries many sizes of both types in stock — call him right now.

Allied Products Completes Addition to Hillsdale Precision Parts Plant

Ralph Hubbard, chairman of the board, Allied Products Corp., Detroit, Mich., has announced that the addition to the corporation's precision parts plant in Hillsdale, Michigan, has been completed and considerable new equipment has been installed and put in operation. This plant, normally en-

gaged in the manufacture of a widely diversified line of hardened and precision ground parts, including R-B interchangeable punches and dies, is presently largely engaged in the production of aircraft engine parts, both for jet and piston engines.

As part of the expansion program, Walter S. Smith, vice president in charge of the plant, has made several changes in the operating organization.

Leland E. Coulter has been named general manager of the R-B interchangeable punch and die activities,



Special methods produce
small quantities
at minimum cost.

When you need just a few pieces — when you're still in the experimental stage — then an economical, cooperative source of parts is important.

Our **Machine-Cut Method** avoids custom die costs completely by use of special machinery which skillfully fashions pilot quantities.

Careful calculation determines the point at which labor costs warrant our **Short Run Method**, which uses simple contour dies and special presses.

Best of all, when you get into large quantities on the experimental part, our **Stampings Division** is still your most economical producer, using our **Production Method**. Thus all three methods are at your disposal. And impartial choice of method saves money for you!

SEND FOR LITERATURE

STAMPINGS DIVISION

"ONE PIECE OR ONE MILLION"

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Leland E. Coulter

with Peter C. Fortune, who is being transferred from Chicago, as the assistant. William Reece has been appointed to head sales in the Chicago territory, and Raymond E. Wilds has been named assistant sales manager of R-B products.



Three Hevi Duty High Temperature furnaces in one of the larger industrial plants.

● The Hevi Duty Alloy 10 High Temperature Furnace is rapidly becoming a standard where uniform, controlled heat to 2350° F is required. A recent installation, illustrated, is part of the research and development division of one of the larger industrial organizations. They report the furnaces are "functioning with complete satisfaction." Bulletins HD339 and 1046 describe these Alloy 10 furnaces — ask for them.

HEVI DUTY ELECTRIC COMPANY
 HEAT TREATING FURNACES **HEVI-DUTY** ELECTRIC EXCLUSIVELY
 DRY TYPE TRANSFORMERS — CONSTANT CURRENT REGULATORS
MILWAUKEE 1, WISCONSIN



MASTUR Boring Heads feature heavier body and block to provide tools with greater rigidity. Increased dove-tail support permits heavier cuts at higher speeds.

Adjusting screw is thread-ground from solid. Screw graduated into 50 divisions for reading in thousandths, and vernier graduations on tool body permits accurate readings of 0.0002-inch.

MASTUR Boring Heads are available in 3 sizes with maximum boring capacities of 7, 11 and 15 inches, respectively. Equipped with any standard shank, boring bars and forged bits, tools are shipped complete and ready for operation.

IMMEDIATE DELIVERY

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354-MC

THE MAXWELL CO.

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John Young Elected President of A. I. S. E.

John L. Young, vice president in charge of engineering for United States Steel Company, has been elected president of the Association of Iron and Steel Engineers for 1953. Other officers elected by the association are as follows: first vice president, E. L. Anderson, superintendent, electrical department, Bethlehem Steel Co., Johnstown, Pa.; second vice president, John H. Vohr, general superintendent, Gary Steel Works, United Steel Co., Gary, Ind.; treasurer, W. H. Collison, assistant general superintendent, blast furnace division, Great Lakes Steel Corp., Ecorse, Mich.; secretary, J. D. O'Roark, assistant to manager, service and maintenance, Weirton Steel Co., Weirton, W. Va.; honorary directors, James Farrington, special assistant to chief plant engineer, Wheeling Steel Corp., Wheeling, W. Va.; C. L. McGranahan, technical assistant to works manager, Sollac, Seremange (Moselle), France; L. F. Coffin, assistant general manager, Bethlehem Steel Co., Sparrows Point, Md.; and director-at-large, L. Larson, chief engineer, Republic Steel Corp., Cleveland, Ohio.

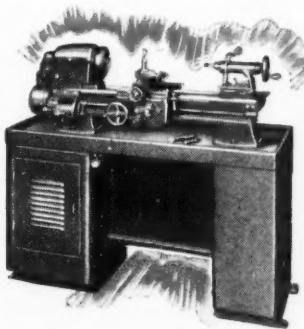
Reconditioning Service for Optical Flats

Acme Scientific Co., Chicago 7, Ill., manufacturer of optical flats, monochromatic lamps, and other precision inspection devices, has announced a rehabilitation service which is said to restore worn and scratched optical flats to original transparency and accuracy. Shop-worn flats, it is claimed, can be reconditioned like new at savings of as much as 40 per cent of the price of a new optical flat.



"Jeepers! That putter of Mac's is as accurate as a

Logan **LATHE!"**



Logan No. 955
QUICK CHANGE GEAR LATHE
11" Swing, 1" Collet
Capacity, 1 $\frac{1}{8}$ " Spindle Hole

PRECISION RESULTS have made the Logan Lathe one of the world's most widely used machine tools. Logan advanced design and rugged, precise construction assure accuracy that stands up under hard daily use. Because the Logan ball bearing spindle, for example, needs no adjustment for any speed from 45 to 1500 rpm, original accuracy is preserved. The two V-ways and two flat ways of the Logan bed are precision ground to a tolerance of .0005", and are warp-free. 11" swing, 1" collet capacity and 1 $\frac{1}{8}$ " spindle hole provide the capacity for a high percentage of any shop's metal turning. Remember, too, no other lathe of comparable specifications can match Logan economy.

LOOK TO LOGAN FOR BETTER LATHES AND SHAPERS

LOGAN ENGINEERING CO.
4901 West Lawrence Avenue, Chicago 30, Illinois

Results of Fifth Annual Engineering Undergraduate Award and Scholarship Design Program

The results of the Fifth Annual Engineering Undergraduate Award and Scholarship Design Program have been announced by The James F. Lincoln Arc Welding Foundation, Cleveland, Ohio. Engineering undergraduates in 23 different schools have been given national engineering recognition

and awards totaling \$5,000, and scholarship funds of \$1,750 have been awarded to three schools in honor of the first three award winners. Awards were made for the best designs of machinery and structures stressing the value of arc welding construction.

The First Award of \$1,129 went to Richard Cheverton and Thomas Musselewhite, Georgia Institute of Technology, for their joint design of a sub-

caliber mount for a recoilless rifle. The design permits the mounting of a .22-caliber barrel in a 75-mm. rifle for training purposes. In honor of the students, the Department of Mechanical Engineering of Georgia Tech received \$1,000 in scholarship funds. Merle Geoffrion, an undergraduate in the Civil Engineering Department, University of Delaware, received the \$564 Second Award for his design of a highway bridge. His department received in his honor a scholarship fund of \$500. The Third Award of \$282 was presented to Robert Murray, Depart-

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MERRYWEATHER
HEAVY DUTY
ANTI-WELD
SOLUBLE OIL



Triple-Chip deters welding and pick-up; prevents rust. Consequently, tool life is lengthened and accurate, milled-finish work is produced. Tool maintenance and replacement is reduced. Furthermore, Triple-Chip is non-injurious to the skin, is smokeless and odorless.

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THE MOTCH & MERRYWEATHER MACHINERY CO.

PENTON BUILDING

CLEVELAND 13, OHIO

COMMAND OUR UNPARALLELED EXPERIENCE IN CIRCULAR SAWING ...

Extensive Stock
OF
**KENNAMETAL TOOLS,
BLANKS, and INSERTS**
NOW CARRIED BY OUR
DISTRICT WAREHOUSES

AT STRATEGIC POINTS

ACROSS THE MAP.



This expanded service enables you to quickly realize the plus value of Kennametal tooling—decreased cost—increased productivity. There's a Kennametal tool for your every need.

If you desire help in tooling problems—selection, application, or maintenance—our field engineers are at your service.

Kennametal Inc., Latrobe, Pa.

KENNAMETAL®
CEMENTED CARBIDE TOOLING
THAT INCREASES PRODUCTIVITY



ment of Architecture, Rensselaer Polytechnic Institute, for his analysis of how to determine the economic span length of standard sections. His school was awarded \$250 in scholarship funds.

**Carl Hirschmann Company
Merges with Hauser Machine
Tool Corporation**

Carl Hirschmann Co., Manhasset, N. Y., exclusive representative in the United States for many European machine tool builders, has announced the complete absorption of Hauser Machine Tool Corporation, also in Manhasset. Both companies market imported precision tools and provide technical assistance in planning tooling programs, full factory service by factory-trained specialists, and spare

parts and accessories for the various imported machine tools.

Carl Hirschmann Company has branch service facilities in Los Angeles, Milwaukee, Chicago, and Detroit. The company is now planning another new branch which will be located in Cleveland, thus making spare parts, accessories, service, and technical assistance available in each of the most important machine tool areas.

**Ex-Cell-O Wins Award for
Best Annual Report**

The "Financial World" Survey of Annual Reports has announced that Ex-Cell-O Corp., Detroit 32, Mich., was judged as having the best annual report of the Machine Tool Industry for the second year. The bronze "Oscar of Industry" trophy was present-

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A.S.A. Plus Acme**



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BUSHING
CATALOG**

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LARGEST
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Simplifies, speeds bushing selection.
Packed with valuable data. Saves you
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etc.

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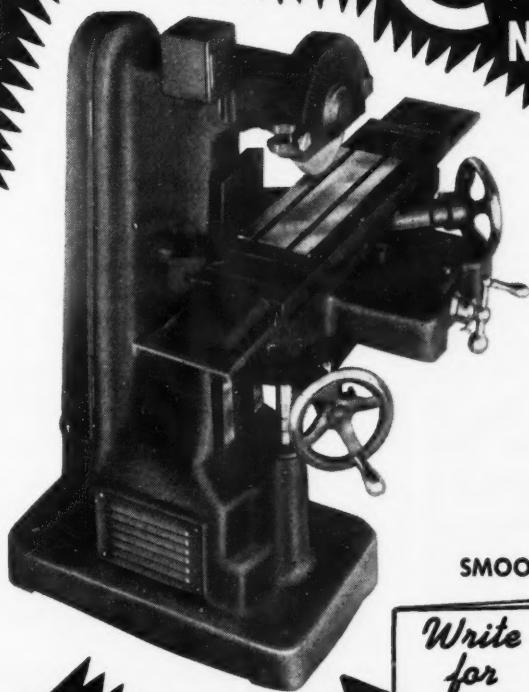
For TOOL & DIE WORK...
SMALL PRODUCTION RUNS

Choose **COVEL**

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6 x 18

SURFACE
GRINDER



Builders, of Precision
Grinders for 78 Years

COVEL PRECISION
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BENTON HARBOR — MICHIGAN

DRILL GRINDERS — UNIVERSAL CUTTER & TOOL GRINDERS —
HYDRAULIC & HAND FEED SURFACE GRINDERS

Write for
BULLETIN
MM-112

LARGE DIAMETER
GRINDING WHEEL
MOUNTED ON
3-SPEED SPINDLE

•
EXTRA CAPACITY

•
RIGID CONSTRUCTION

•
SMOOTH ACTING HARDENED
AND GROUNDED LEAD
SCREWS AND KNEE WAYS

•
LONG-WEARING
HARD CHROME
TABLE WAYS

PROMPT
DELIVERIES
FOR DEFENSE

ed by Weston Smith, executive vice president and originator of the annual report surveys, to H. Glenn Bixby, Ex-Cell-O president, at the Annual Awards Banquet held recently in the Grand Ballroom of the Hotel Statler in New York. More than 1,300 business and financial executives from all over the United States and Canada attended the banquet.

A total of 5,000 annual reports was

considered in the international competition and judged in 100 industrial classifications for the "Best of Industry" awards. In the machine tool category, Monarch Machine Tool Company was runner-up for the top honors and The Cincinnati Milling Machine Company placed third.

H. Glenn Bixby

**Accurate Hole Transfer Made Easy With
NIELSEN TRANSFER SCREWS**

Simply insert in holes, invert, strike sharply and you have centers and drill circles perfectly located. Reduce time and eliminate spoilage of other methods. 8 sizes, from $\frac{1}{8}$ " to $\frac{1}{2}$ " U.S.S. Inexpensive — last for years.

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**NIELSEN TOOL &
DIE COMPANY**
P. O. Box 1067
Berkley, Mich.

Clark
**ADJUSTABLE
HOLE
CUTTER**

MM-11

For complete information call your Clark Cutter Jobber now or write Factory B
ROBERT H. CLARK COMPANY
9330 Santa Monica Blvd., Beverly Hills, Calif.

Manufacturers of Precision Cutting Tools

A.M.T.D.A. Elects Officers

Officers and executive committee members were elected by the American Machine Tool Distributors' Association at its 28th Annual Meeting held recently at The Cavalier Hotel, Virginia Beach, Virginia. The following officers were elected to serve for the ensuing year: president, John M. Riordan, Riordan Machinery Co., Detroit, Mich.; vice president, E. R. Motch, Jr., The Motch & Merryweather Machinery Co., Cleveland, Ohio; second vice president, Thomas R. Rudel, Rudel Machinery Co., Inc., New York, N. Y.; and secretary-treasurer, George B. McClenen, Delta Equipment Co., Philadelphia.

Severance Regrinding Service ★ HIGH SPEED and CARBIDE ★

CONSERVE STRATEGIC MATERIAL!

YOUR DULL ROTARY FILES CAN BE GROUND INTO NEW MIDGET MILL TYPE TOOLS LIKE THIS

WE REGRIND: MIDGET MILLS, COUNTER SINKS END MILLS, MILLING CUTTERS, PINKING CUTTERS ETC.
START USING THIS MONEY SAVING SERVICE NOW!

Severance Tool Industries Inc.

724 IOWA AVE., SAGINAW, MICH.
In Canada: 60 Front St. W., Toronto

FOR Strictly IMPERSONAL INSPECTION CHOOSE AMES DIAL COMPARATORS

Ames Dial Comparators make the inspection of duplicate parts an extremely simple, rapid and accurate operation. Ames Comparators are strictly impersonal in their accuracy — the results being in no way dependent on the skill or judgment of the operator. The pressure of the gauging members against the work is mechanically determined and therefore uniform.

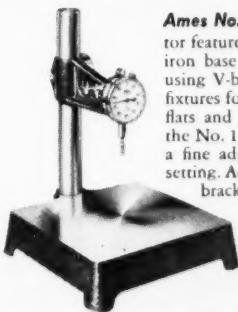
Check the Ames Dial Comparators shown — one of them may solve a Quality Control problem for you.



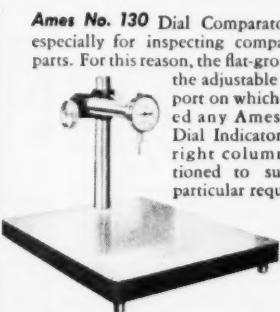
Ames No. 1 Dial Comparator is an easily adjustable bench model that measures objects up to 2" in cross section. The table bracket may be quickly located and locked in position on the column. The table itself may be further positioned and locked for final fine adjustment. This comparator is designated Ames No. 1W when equipped with dead-weight contact pressure and contact area to ASTM specifications for measuring resilient materials.



Ames No. 2 Dial Comparator is a compact, stable bench model for measuring non-yielding materials — sheet metal, glass, hard rubber. The 2" diameter table is adjustable to bring pointer to zero. Ames No. 2W is similar to the Ames No. 2, but is furnished with dead-weight contact pressure and contact areas to ASTM specifications for checking textiles, plastics, sheet rubber, etc.



Ames No. 13 Dial Comparator features flat-ground, cast-iron base of ample size for using V-blocks and locating fixtures for checking rounds, flats and odd shapes. Also, the No. 13 can be fitted with a fine adjustment for close setting. Accurately adjustable bracket holds any Ames Micrometer Dial Indicator.



Ames No. 130 Dial Comparator is designed especially for inspecting comparatively large parts. For this reason, the flat-ground steel base, the adjustable indicator support on which can be mounted any Ames Micrometer Dial Indicator, and the upright column are proportioned to suit the user's particular requirements.

Send us your Quality Control job specifications, and we will supply complete details and proposal without obligation.

Representatives in
principal cities.

B. C. AMES CO.

29 Ames Street
Waltham 54, Mass.

Mfgr. of Micrometer Dial Gauges • Micrometer Dial Indicators

Simonds Abrasive Completes Modernization Program

To increase the production and to perform more uniform curing of high-speed grinding wheels molded of abrasives bonded with Bakelite phenolic resins are the goals of a modernization and expansion program recently completed by Simonds Abrasive Co., Philadelphia, Pa. New machines in-

stalled to speed production include eight-deck abrasive screening units; specially-designed hydraulic-powered mixers; automatic presses for high-speed shaping of small and medium-size grinding wheels; a giant press for the production of large wheels up to 36 inches in diameter; a continuous cart-type curing oven; and a new type machine for facing cured wheels. Air conditioning has been extended from the blending area where abrasives and bonding resins are mixed throughout the departments where blending, pressing, and curing operations are performed.

Simonds has also developed a method of injection-molding Bakelite styrene plastic modified with rubber into the center holes of grinding wheels up to 12 inches in diameter to form the arbor holes. Rubber-modified styrene plastic is said to have high impact resistance, and its low specific gravity is said to minimize the danger of the wheels being unbalanced by the arbor hole lining.

CUTS



ARMOR PLATE LIKE BUTTER

PROBLEM: MILL 23½" x 2¼" SURFACE OF TANK CARRIER!

The material — the toughest armor plate casting yet devised for military purposes! An impossible operation with other types of cutters tested.

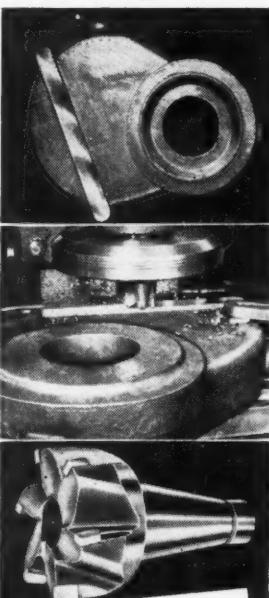
SOLUTION: STOCK REMOVAL ¾" to ½" IN 3 CUTS —

Finished surface parallel within .002 — NO REJECTS! A smooth machine-like finish at 10½" per minute.

HERE'S THE NELCO TOOL THAT SOLVED THIS VITAL DEFENSE BOTTLE NECK!

The rugged virtually indestructible NELCO Taper Shank End Mill — A 4" carbide tipped cutter that literally chews away half an inch of the toughest alloy Armor Plate America has produced — leaving a smooth, accurate machine-like finish.

Write for catalog and complete details on this husky NELCO TAPER SHANK END MILL and the hundreds of other NELCO Engineered Carbide Tools — TODAY!



NELCO TOOLS

NELCO TOOL COMPANY, INC., MANCHESTER, CONNECTICUT

For that Extra Edge in Production

.0001" in six inches



PLUS every known attachment

A symbol of extreme accuracy, this Rivett 608 lathe is used in nearly every instrument and tool shop where fine exacting work is performed. A greater number of mechanical marvels have been developed on this lathe than on all other machine tools combined. The 608 is a small but exceedingly powerful back-gearied, screw cutting

Guarantee
The Rivett 608 will turn or bore within .0001" in six inches work held in collet, and turn between centers within .0001" in six inches. The Rivett 608 will face to eight inches diameter within a limit of .0002" concave, .0000" convex. The Rivett 608 will cut threads within .00005" in twelve inches, or within .0003" in any three inches, or within .0002" in any inch of a specimen piece.

engine lathe, with slide areas equal to those of other lathes twice its size. Finely-made attachments are available for milling, spiral-cutting, slotting, relieving, taper turning, radius turning, grinding, and forming. Write for Bulletin 608F.



RIVETT

LATHE & GRINDER, Inc.

Dept. MMSR11, Brighton 35, Boston, Mass.

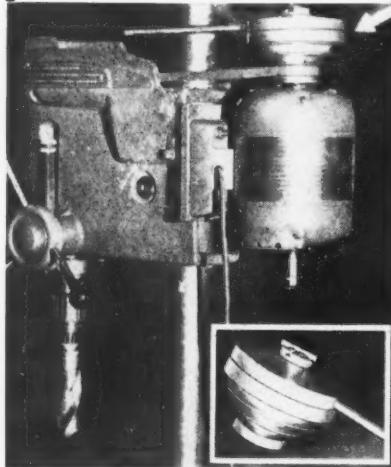
For More Precision Work RELY ON RIVETT LATHES AND GRINDERS, The Master Craftsman's Master Tools

New

"PULL-GEAR"

Speed Reducing Pulley

Increases
Drill Press Capacity



Amazing new internally geared speed reducer doubles drill press capacity. Greater power, greater efficiency, greater productivity.

Provides the correct speed and power for larger drilling, reaming, tapping and boring on light presses. Easily installed in five minutes. Adaptable to all type machines. Spindle speed range approx. 45 to 2000 RPM.

Made in 3 Motor Shaft Sizes— $\frac{1}{2}$ ", $\frac{5}{8}$ ", $\frac{3}{4}$ ".

Several Models Available

Write for Literature

Some Territories Open to Jobbers

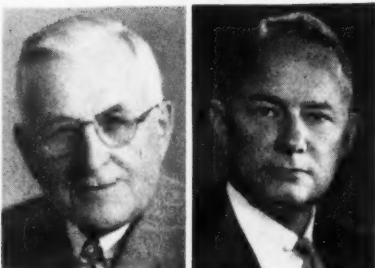
THE PULL-GEAR CO.

21125 DEQUINDRE ST.

HAZEL PARK

•

MICHIGAN



John M. Riordan (left) and Thomas R. Rudel

Members of the executive committee who were elected for the terms expiring in 1955 are: C. Kyre Raber, State Machinery Co., Indianapolis, Ind.; R. A. Vidinghoff, Machinery Associates, Inc., Philadelphia, Pa.; and Spencer B. Booz, Federal Machinery Sales Co., Chicago, Illinois.

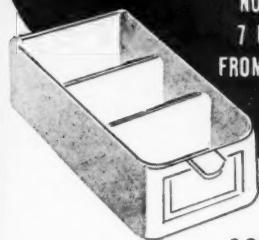
C. J. Harter, C. J. Harter, Machinery, Houston, Texas, was selected for the term expiring 1953 to fill the unexpired term of Thomas R. Rudel.



"Eat your cereal, so you'll grow up to be a dough-getter like your mother."

SMALL PARTS CABINETS

NOW AVAILABLE IN
7 USEFUL SIZES—
FROM 8 TO 64 DRAWERS



1001 Time-Saving Uses For Home and Business!

Ideal for small parts...washers...nails...screws...bolts...nuts...drills...taps...carbide tips...mounted points...tools...brads...tacks...and YOU NAME IT!

All-metal JIFFY Cabinets have a sturdy steel frame with hammered aluminum finish in silver-gray color.

Drawers are of solid aluminum, measuring 1 1/4" high, 2 3/4" wide and 5 3/4" deep. Individual metal drawer guides keep the drawers in a free-sliding position.

Each JIFFY Cabinet is supplied with its full requirement of removable drawer-dividers and index labels.

CLIP AND MAIL

TO: HANDY PRODUCTS CO.
P.O. BOX 2447, CLEVELAND 12, OHIO

PLEASE SEND IMMEDIATELY THE QUANTITY AND SIZE JIFFY UNIT LISTED BELOW

<input type="checkbox"/> 64 Drw. @ \$24.95*	<input type="checkbox"/> 48 Drw. @ \$19.95*	<input type="checkbox"/> 32 Drw. @ \$12.95*	<input type="checkbox"/> 24 Drw. @ \$9.95*	<input type="checkbox"/> 16 Drw. @ \$7.95*	<input type="checkbox"/> 12 Drw. @ \$6.95	<input type="checkbox"/> 8 Drw. @ \$4.95*
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WE PAY ALL SHIPPING COSTS

FIRM

Please Ship as Follows:

<input type="checkbox"/>	Open Account, Purchase Order Enclosed.
<input type="checkbox"/>	Check or Money Order Enclosed.
<input type="checkbox"/>	C.O.D.

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Ohio Customers Add 3% Sales Tax.

Metal-Working News in Brief

Electric Equipment Co., Rochester 1, N. Y., has announced the appointment of **Warren A. Hafner** as manager of its Machine Shop Division.

— o —

Westinghouse Air Brake Co., Wilmerding, Pa., has purchased a majority interest of Le Roi Co., Milwaukee, Wis., manufacturer of engines, portable compressors, and rock drills.

Robert D. Schliem, formerly connected with the Process Engineering Department, has been advanced to chief inspector for C. A. Norgren Co., Englewood, Colorado.

— o —

Fred W. Scott, Jr., formerly manager of sales for the Coated Products Division, The Carborundum Co., Niagara Falls, N. Y., has been appointed manager of the newly established Merchandising Sales Division.

— o —

P. F. Marsaw has been named personnel manager of Reed Rolled Thread Die Co., Worcester, Mass. Mr. Marsaw was formerly assistant plant manager of Morgan Works, Wickwire - Spencer Steel Division of Colorado Fuel & Iron Corporation.

— o —

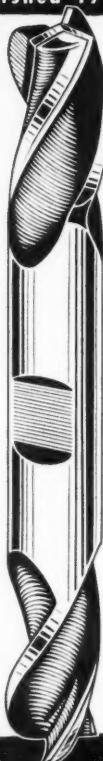
The Taft-Pierce Mfg. Co., Woonsocket, R. I., has announced the appointment of **Carl Johnson** as foreman of the toolroom and **Russell Shepherd** as sales representative in the New England territory for standard products and contract manufacturing activities.

ARROW TOOL & REAMER CO., Established 1916

ARROW END MILLS A COMPLETE LINE

Arrow's engineering skill and production experience gained during 36 years as a major supplier of precision tooling is your assurance of custom quality, prompt service and superior performance.

Write today for details on Arrow's simplified fast service on "Specials"



ARROW TOOL & REAMER CO.

418-422 LIVERNOIS AVE. • DETROIT 9, MICH.



WHY THEY ORDER

CIMCOOL Again And Again

... BECAUSE CIMCOOL® LOWERS COSTS! Plant after plant has reported over and over that this revolutionary cutting fluid—this chemical emulsion—does a better job, too, while saving money three important ways:

CIMCOOL INCREASES TOOL LIFE (and thus reduces down time) because of its chemical lubricity.

• FASTER SPEEDS are possible because Cimcool cools faster, through a unique physical change in the cutting fluid itself. Tools and chips actually stay cool to the touch.

CIMCOOL COSTS LESS than old-fashioned cutting fluids because it lasts longer. It also cuts labor costs for cleaning and changing. It virtually eliminates rancidity and foul odors. And because of its low surface tension and low adhesion to work and chips, there is practically no carry off.

To see how CIMCOOL can improve the working picture so many ways at your plant, ask for a demonstration. Just write us and we'll have one of our Cincinnati Milling-trained machinists call on you—without cost or obligation. Or, if you prefer, write for our free booklet "CIMCOOL Defeats Heat." Address, Sales Manager, Cincinnati Milling Products Division, The Cincinnati Milling Machine Co., Cincinnati 9, Ohio.

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**A Production-Proved
Product of
THE CINCINNATI MILLING
MACHINE CO.**



CIMCOOL
for **85%**
OF ALL METAL CUTTING JOBS

Metal-Working News in Brief

G. J. Seifert has been appointed representative for Diamond Tool Research Co., Inc., New York 17, N. Y., in the southern New Jersey, eastern Pennsylvania, Delaware, and Maryland areas.

— o —

John Hellstrom, vice president, American Air Filter Co., Louisville,

Ky., has been appointed director of sales of all AAF and Herman Nelson products. Assisting Mr. Hellstrom will be **Robert W. Nelson**, vice president, formerly of the Herman Nelson Division.

— o —

Morse Twist Drill & Machine Co., New Bedford, Mass., has announced the appointment of **J. T. Maidens** as manager of the Philadelphia territory, assisted by **William Rogers**. **James D. Oakley** will succeed Mr. Maidens in the Indiana territory.

— o —

Frederick L. Curtis, retired vice president of Raybestos - Manhattan, Inc., Passaic, N. J., and former general manager of the Manhattan Rubber Division, died recently at the age of 84.

— o —

Syntron Newark Sales Co., Newark, N. J., representing and selling the complete line of products manufactured by Syntron Co., Homer City, Pa., has opened a new headquarters at 140 Route No. 17 & Henry St., Hasbrouck Heights.

HUOT

DRILL DISPENSER

Eliminates Rummaging
Through Stacks of Drills

HUOT MANUFACTURING CO.

538 N. Wheeler St., St. Paul W4, Minn.

By the
makers of
HUOT
DRILL
INDEX

Made in three models for fractional,
number or letter drills.

"HUOT" is pronounced "HEW-OT"

Buckeye

BRONZESMITHS

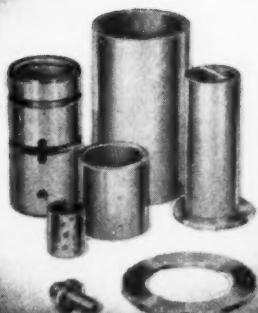
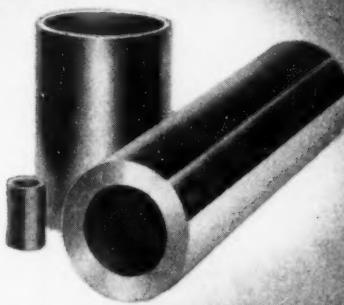


SINCE 1900

Rx FOR CUTTING COSTS

"The Lowest Cost Bronze
Bearings Are Those That Can
GO THE DISTANCE!"

For Stock Bearings
and Maintenance Bars
SEE YOUR NEAREST
BUCKEYE DISTRIBUTOR!



FOR SPECIALS

For Bearings to your
specifications, write direct
to The Buckeye Brass and
Manufacturing Company,
6410 Hawthorne Avenue,
Cleveland 3, Ohio

BARS • BEARINGS • BUSHINGS

Metal-Working News in Brief

E. B. Andrews, former sales manager of the O. K. Tool Company, has been named president and general manager of Technical Equipment Sales Co., 2430 Central Pkwy., Cincinnati, Ohio, a new organization formed for the exclusive representation of a number of well-known manufacturers of machinery, machine tools, precision measuring instruments, and mechanical components

in southern Ohio, Indiana, and Kentucky. Associated with Mr. Andrews is **Harry S. Robinson**, former treasurer and general manager of The Cincinnati Shaper Company.

— o —

Fred Hennig, Jr., formerly Pittsburgh district manager, Kennametal, Inc., Latrobe, Pa., has been appointed manager of the company's Chicago-Midwestern district with offices at 5830 W. 26th St., Chicago, Illinois.

— o —

Dr. Samuel S. Kistler, internationally known chemical engineer and world-renowned authority on abrasives, has been appointed research associate of Peninsular Grinding Wheel Co., Detroit, Mich. Dr. Kistler was formerly director of research for Norton.

— o —

The Bellows Co., Akron 9, Ohio, has announced the appointment of **Kenneth R. Blaisdell** as field engineer in the Springfield, Mass., territory. Mr. Blaisdell will handle the sales and servicing of the company's complete line of air powered equipment.



Zagar 2" holding fixture



Zagar 1" indexing fixture



Depend upon
Zagar FIXTURES, too!

When all is said, this is the first, middle and last consideration — that fixtures, holding and indexing, must HOLD. On that score, Zagars have qualified famously for years — in simple and intricate machining operations. Accurate construction gives accurate performance. Zagar also has a complete line of air-operated holding fixtures and collet lathe chucks. Prompt deliveries NOW!

Write for Engineering Manual S-11

ZAGAR TOOL, INC., 24000 Lakeland Blvd., Cleveland 23, Ohio



Zagar

**TOOLS FOR INDUSTRY
and SPECIAL MACHINERY**

Van Keuren

BIG ONES

LITTLE ONES

ANY SIZE

AT ALL



**LARGE
AND
SMALL
MEASURING
WIRES**

PERFECT cylinders for all measuring purposes,—Threads, Gears, splines, dovetails and angles.

Complete specifications on Van Keuren Measuring Wires, and formulas for their use are given in the Van Keuren 1952 Catalog and Handbook No. 35.

Write for your copy

THE

Van Keuren

33rd YEAR

CO., 175 WALTHAM STREET, WATERTOWN, MASS.

Light Wave Equipment • Light Wave Micrometers • Gage Blocks • Taper Insert Plug Gages • Wire Type Plug Gages • Measuring Wires • Thread Measuring Wires • Gear Measuring System • Shop Triangles • Carbonyl Plug Gages • Carbonyl Measuring Wires.

Metal-Working News in Brief

Allied Products Corp., Detroit, Mich., has announced several additions to its executive staff. **Merle E. Kremer**, formerly associated with General Electric Company, has been appointed assistant to the president; **Wynne R. Lilly**, formerly with Dura Corporation, has been named supervisor of new product development; and **Milton M. Sten-**

strom, formerly with Pontiac Division of General Motors Corporation, has been named to direct employee and personnel relations.

— o —

Denison Engineering Co., Columbus, Ohio, manufacturer of oil hydraulic equipment, has announced the opening of a branch office at 4306 W. 63rd St., Chicago, to headquarter the company's Central Regional Supervisory Office, as well as to serve Chicago and environs.

— o —

Nils C. Johanson has been appointed resident demonstrator in the Cleveland, Ohio, area for Norton Company's Grinding Machine Division. Mr. Johanson replaced **Alfred C. Womer** who was transferred to the company's Abrasive Division.

— o —



NO LOST TIME FUMBLING WITH LOOSE WIRES. ONE SUBTRACTION GIVES PITCH DIAMETER. One hand holds and locates the three wires comfortably. Each unit is calibrated and uses "Best Wire Size" for one pitch. Measures any diameter up to $2\frac{1}{2}$ ". Tolerance-plus .0000, minus .0002".

Available in following American Standard Pitches: 32, 28, 27, 24, 20, 18, 16, 14, 13, 12, 11, 10 threads per inch.

Each gauge for one pitch only.

ORDER DIRECT FROM:

SCULLY MACHINE COMPANY
62 Walter Street

Bridgeport, Connecticut

SANFORD BENCH SURFACE GRINDER

MODEL "SG"

for Wet* or Dry Grinding!

PRECISION • SPEED • SENSITIVITY

A low cost, precision machine for surface grinding dies, instrument parts, gauges and other small parts which would fit in the palm of the hand.

By using Sanford Bench Grinders many manufacturers of precision machinery have drastically cut over-all costs for finishing small intricate parts. This releases large, more expensive machines for heavier duty work.

The Sanford SG is the only low cost Bench Surface Grinder that

- Grinds to less than .0001" tolerances
- Operates without vibration
- Assures long life because Meehanite castings are used in its construction

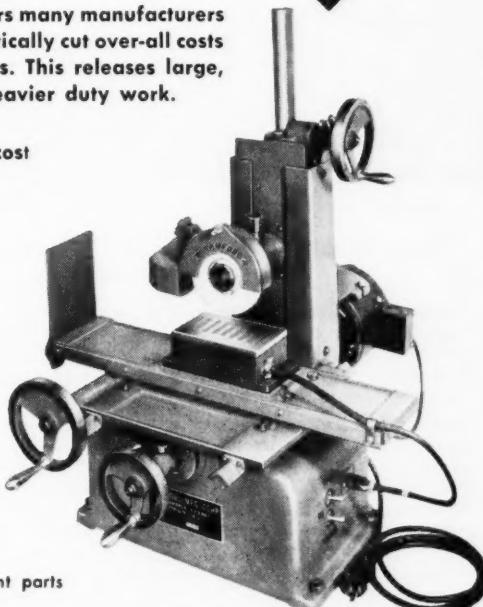
SPECIFICATIONS—4" traverse
—8" longitudinal—6" vertical
under 4" wheel. Approximate weight 160 lbs.

Complete details are included in illustrated bulletin.

Send for your copy today.

Reconditioning facilities, replacement parts and special attachments are available.

Send for price list.



*With optional equipment

SANFORD

MANUFACTURING CORP.
1022 Commerce Ave., Union, N. J.

Metal-Working News in Brief

Brown & Sharpe Mfg. Co., Providence, R. I., has announced the appointment of **Thomas F. MacLaren**, former representative in Los Angeles, as representative in the Chicago office, succeeding **Howard K. Jackson** who

has been given special assignments by the home office. **Frank K. Wilkey**, formerly located in San Francisco, has been appointed representative in the Los Angeles office, and **Henry T. Spooner** of the Providence office will join the Los Angeles sales organization.

— o —

Harold A. Burnip has been appointed director of purchase engineering for The Lincoln Electric Co., Cleveland, Ohio. Mr. Burnip has been with Lincoln for 10 years, serving as project engineer in recent years.

— o —

The Hydraulic Press Mfg. Co., Mount Gilead, Ohio, has announced the appointment of **Richard K. Schrecongost** as manager of its die casting machinery division.

— o —

William H. Dunn, retired treasurer and director of Raybestos - Manhattan, Inc., Passaic, N. J., died recently at his home in South Orange, New Jersey, at the age of 69.



With PARKER Type Holders and Interchangeable Steel Type Sets

Set hand or press markings quickly, easily to meet each day's changing needs. Parker Type Holders and Steel Type Sets assure new flexibility, making any required stamp available *in seconds*. Part numbers, dating, inspection numbers—a press or hand marking stamp for any material, any job is always at your fingertips. Number, and number and letter sets are scientifically compiled to permit the widest versatility, largest number of words. Threaded shank is furnished to allow hand stamp to be made into press stamp in an instant. Each set is crafted with traditional Parker skill to guarantee years of clean, permanent stamping—the convenience and utility of many dies in one economical unit.

Write TODAY for literature and prices on the many dollar saving Parker type sets available.





**DRILL and
PILOT
BUSHINGS**
**Frictionless
—Rotary**

For core drilling, T.C. and high speed boring, turret tool, piloting, etc. Won't stick or clog. Dust proof as a watch. Write for details.

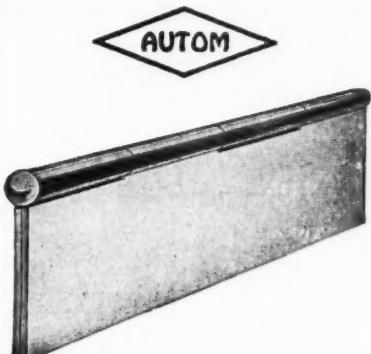
GATCO ROTARY BUSHING CO.
42330 Ann Arbor Road, Plymouth, Michigan

C A M S

We are fully equipped to GRIND OR MILL a complete range of CAMS to your specifications on our ROWBOTTOM Cam Milling Machines.

Your inquiries answered promptly.

HIMOFF MACHINE CO., INC.
23-16 44th Road Long Island City 1, N.Y.



CONTINUOUS HINGES

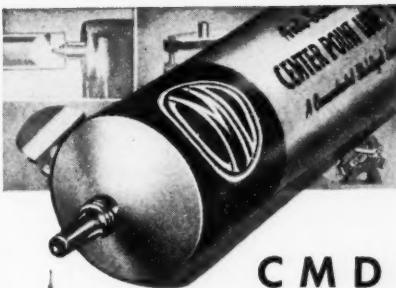
Manufactured by

**AUTO MOULDING
& MFG. CO.**

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1114 E. 87TH ST.

CHICAGO 19



C M D

LUBRICANTS

PAY OFF in higher production

... Because they have better anti-scoring qualities to work under extreme pressures.

Use CMD on your lathe centers, die set leader pins, steady rests, machine ways, cams, broaches, thrust bearings, taps and dies, to name a few. In fact, CMD lubricants work every day under pressures of 40,000 to 50,000 pounds per square inch in thousands of plants from coast to coast.

CHICAGO MANUFACTURING

& DISTRIBUTING COMPANY

1910 West 46th Street Chicago 9, Illinois

Attach this coupon to
your letterhead for
FREE SAMPLE KIT No. 711

Your Name _____

Firm Name _____

Address _____

Metal-Working News in Brief

Jiffy Mfg. Co., Hillside, N. J., manufacturer of padded packing materials, has announced the return of **C. F. Johnson** to his duties as assistant sales manager of the Industrial Division after serving in the Navy for the past two years. The company has also announced the appointment of **John D. Farrington, Jr.**, as packaging engi-

neer. Mr. Farrington was formerly associated with Marshall Field.

— o —

Shell Chemical Corp., New York 20, N. Y., has announced the appointment of **G. W. Huldrum, Jr.**, as sales manager of the eastern division and **V. C. Irvine** as sales manager of the western division succeeding Mr. Huldrum. Mr. Huldrum succeeds **J. G. Frye** who has resigned to take up another post.

— o —

Air Reduction Sales Co., New York 17, N. Y., has announced the appointment of **A. S. Blodget, Jr.**, as manager of its Pittsburgh district. **E. S. Twining, Jr.**, formerly assistant sales manager of the Philadelphia district, succeeds Mr. Blodget as manager of the Boston district.

— o —

The Producto Machine Co., Bridgeport, Conn., has announced the appointment of **David S. Hodgson** as New York district manager. Mr. Hodgson will oversee the company's new sales office in Rochester, N. Y.

Presently in use
by leading
manufacturers!

DIMCO

HEAVY DUTY
RADIAL DRILLING
MACHINES

IMMEDIATE
DELIVERY!

NO PRIORITIES
REQUIRED!

No. TR-1N 4 ft.
No. TR-2N 5 ft.

Rigidly built and carefully constructed for top performance and production economy, these radial drilling machines feature hardened and ground gears of high tensile alloy steel, accurately balanced and precision cut.

PARTIAL SPECIFICATIONS

Drilling cap. in cast iron	TR-1N	TR-2N
Drilling cap. in steel	2 $\frac{1}{2}$ "	2 $\frac{1}{2}$ "
Max. drilling radius	2"	2"
Vert. travel of spindle	45 $\frac{1}{2}$ "	65 $\frac{1}{2}$ "
Spindle speeds (16)	13 $\frac{1}{2}$ "	13 $\frac{1}{2}$ "
	40-1500 rpm	40-1500 rpm

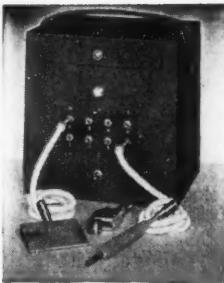
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Mark hardened parts, tools, dies, gages and fixtures of any ferrous metals including the hardest alloys and carbides—quickly—plainly. • Three sizes to meet all requirements.

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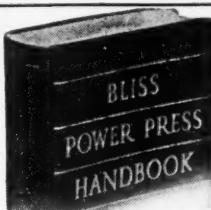
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take up their own wear

- Compare this cross-section of a Leiman Air Pump with any other rotary pump. It is working air space that counts—and Leiman provides 2 to 3 times more area, per size and weight of pump.

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700 pages • 450 illustrations

Sections on: Computing press jobs • Selecting proper press • Useful engineering tables • Die illustrations • Complete glossary • Plus a service section for Bliss presses. \$7.50.

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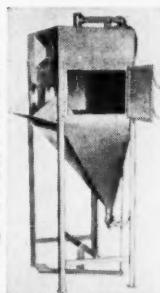
HANDLE your pressure, vacuum or suction jobs with much smaller Leiman Air Pumps. Save weight and space—run at lower r.p.m.—have fewer moving parts—no springs, gaskets or packing—no tips to renew—nothing to give trouble.

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without acids or scratch brushes

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SANDBLASTS**

Fast, low-cost, safe, uniform way to clean scaly, rusty, rough surfaces—prepare for plating and finishing—stencil letters and designs—more rapid matte or satin finishes. Use unskilled help. For Sandblasts—

write DEPT. B



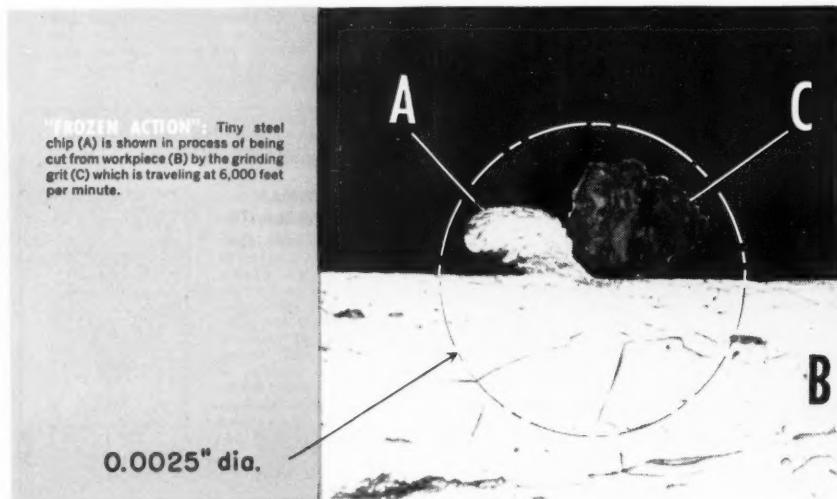
Basic new concept by world's leader in machine tools led to

CINCINNATI Grinding Wheels

FRANK RECOGNITION of the grinding wheel as a *cutting tool* has led to a new approach in Cincinnati Grinding Wheels. Through 25 years of research in chip formation, Cincinnati Milling has proved that the grinding process is a true metal cutting

process. The grinding grits do not abrade or wear away the surface of a workpiece but form chips which agree in classification with the basic chip types found in other metal cutting processes.

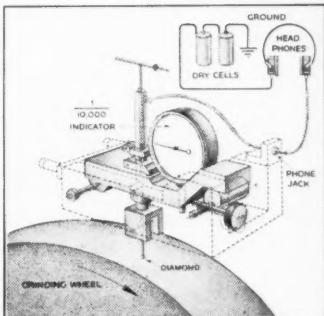
This new concept is the beginning of a



whole new approach to grinding wheels—the development of the grinding wheel as a true cutting tool. And it is a development you might expect from Cincinnati Milling, with the world's largest background of research and experience in metal cutting operations.

For you, this means grinding wheels developed and tested over a period of several years on the basis of true function—as true cutting tools forming true chips.

Available to you is a field organization of trained machinists who know grinding and grinding machines as well as grinding wheels. For a demonstration on your own machines of how to get the most out of Cincinnati Grinding Wheels, just write, wire or phone Cincinnati Milling Products Division, The Cincinnati Milling Machine Company.



TRUE VALUE of grinding wheel wear are obtained by instrument which gives consistent measurement of changes in wheel radius within .00005".

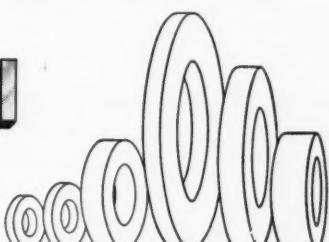
DIAGRAM of the instrument which was developed by Cincinnati Milling to determine the true value of wheel wear by accurate measure of the wheel itself.

FREE BOOKLET. Just off the presses is a brand new booklet entitled "A New Concept In Grinding Wheels." It's packed with important information for anyone interested in grinding operations. A copy is yours for the asking. Just write Sales Manager, Cincinnati Milling Products Division, The Cincinnati Milling Machine Co., Cincinnati 9, O.

CINCINNATI

Grinding Wheels

THE CINCINNATI MILLING MACHINE CO.
Cincinnati 9, Ohio



Metal-Working News in Brief

Syntron Birmingham Sales Company, distributor of Syntron vibratory material handling equipment, portable power tools, selenium rectifiers, Diesel pile hammers, electric heating elements, shaft seals, and paper joggers, has announced the opening of new offices at 1831 29th Ave., So., Birmingham 9, Alabama.

David A. Thomas has been appointed executive vice president and general manager of Automatic Steel Products, Inc., Canton, Ohio. Mr. Thomas was formerly connected with American Insulator Corp., New Freedom, Pennsylvania.

— o —

The L. S. Starrett Co., Athol, Mass., has announced the following changes in administration personnel:

Wallace Findlay, formerly assistant treasurer, has been appointed treasurer and director;

Clifton G. Bigwood, vice president in charge of plant operations, has also been appointed a director;

Douglas R. Starrett, chief methods engineer, has been elected a director;

Edward L. Schmidt, secretary and clerk, has been appointed assistant treasurer; and

Harry Anderson, credit manager, has also been named assistant treasurer.

Alfred Emery, formerly connected with Standard Gauge Company, has become experimental engineer.



THE Staples Carbide-Tipped Shell Type Expansion Reamer gives greatest economy for all types of hand and power driven line reaming or accurate piloted reaming. To compensate for wear, the reamer shell is expanded by driving it up the tapered arbor.

Wherever precision hole production is required with a high degree of tool accuracy, fine hole finish and long tool life, Staples Tools prove their superiority.

Ask for our recommendations on your requirements for standard or special tools.

THE STAPLES TOOL COMPANY, Cincinnati 25, Ohio

Distributors in Major Cities

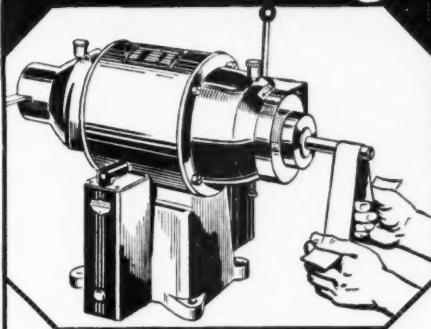
Staples CARBIDE-TIPPED CUTTING TOOLS

A complete line of Circular Carbide-Tipped Cutting Tools
Expansion Reamers — Special Tools

Cut Polishing Time up to 80%

with

SCHAUER SPEED LATHES

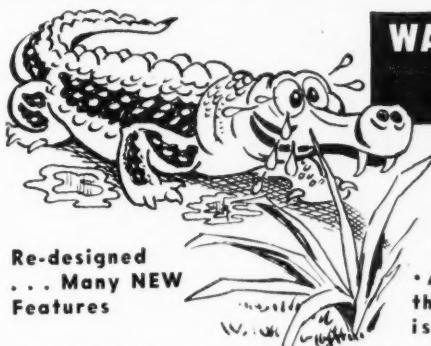


Write for BULLETIN 500 showing types
for all secondary finishing operations.

SCHAUER MANUFACTURING CORP. - Originators of Today's Speed Lathes

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CINCINNATI 36, OHIO



Re-designed
... Many NEW
Features

Write Today for Complete Details

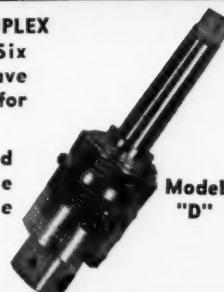
CHANDLER TOOL COMPANY, MUNCIE, INDIANA

WASTE NO MORE TEARS

*On Boring and
Facing Problems*

CHANDLER DUPLEX
Is Made in Six
Sizes—All Have
Power Feed for
Facing

• A Boring Head
that Won't Face
is Not Complete



COMBINED BORING &

FACING TOOL HEADS

Chandler Duplex

Metal-Working News in Brief

David B. Tyler has been appointed advertising manager of Norton Behr-Manning Overseas Inc., Worcester 6, Mass. Mr. Tyler will be responsible for all foreign advertising and will work out of his office in Worcester.

— o —

Norton Co., Worcester 6, Mass., has announced that George H. Powers has been appointed refractories engineer,

succeeding Fred E. Leiby who retired recently after serving 29 years with the company. Mr. Powers will be responsible for the New York and New Jersey territory. Lincoln M. Johnson has been named honing engineer to co-operate with the Micromatic Hone Corp., Detroit, Mich. Enfried T. Larson, formerly sales engineer, has been appointed editor of technical publications and will be responsible for editing "Grits and Grinds" and all technical bulletins.

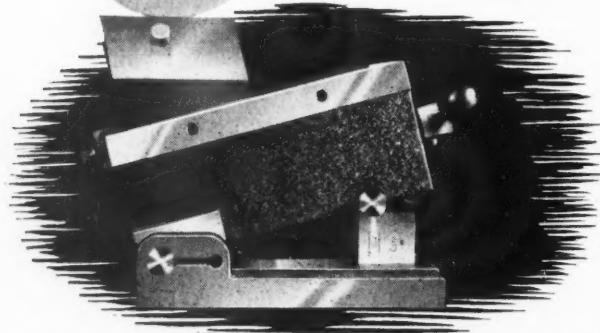
— o —

H. E. Dicker-
man Mfg. Co.,
Springfield,
Mass., has an-
nounced the ap-
pointment of
Joseph C. Fletcher Co., 1415 Folsom St., San Francisco, Calif., to handle Dicker-
man punch press
feeds in northern
California.

— o —

Honan - Crane
Corp., Lebanon,
Ind., has an-
nounced the ap-
pointment of **D.
J. Jones** as gen-
eral sales man-
ager. Mr. Jones
has been associ-
ated with the
company since
1948 and was
formerly district
manager for the
eastern sales ter-
ritory.

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POSITIVE ANGULAR ACCURACY



For any angular set-up, whether single or compound, simply insert standard gauge blocks between the Magna-Sine plates. Proper gauge blocks are indicated in the Robbins Table of Constants. Positive accuracy in a few moments. Work is securely held by magnetic attraction. In two models and sizes; also non-magnetic models for inspection set-ups.

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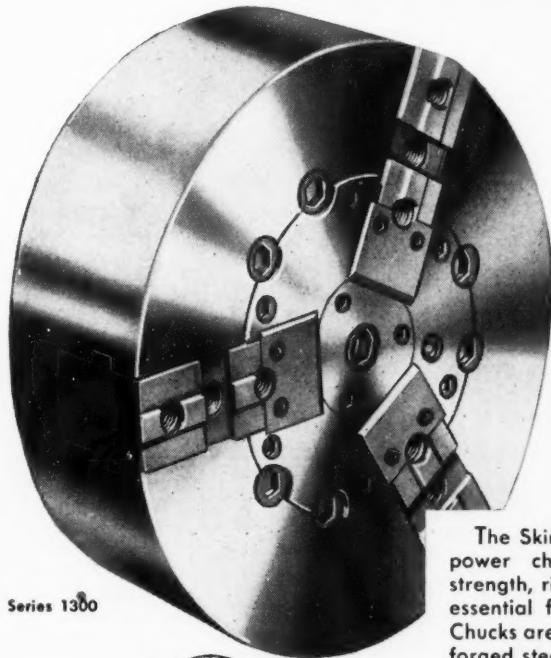


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Manufacturers of the MAGNA-SINE and Other Precision Tools

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**SKINNER
CHUCKS
HAVE POWER
TO PUSH PRODUCTION!**



Write for catalog giving complete details on the Skinner line of power and manually operated chucks. And ask about new movie "Chucks and Their Uses" — available for free showings.

The Skinner line of power chucks and power chucking equipment has the strength, rigidity and design features so essential for today's production needs. Chucks are available from 6" to 21" with forged steel bodies, and with either 2 or 3 adjustable or non-adjustable jaws. Exclusive sliding wedge construction grips internal or external work positively regardless of jaw position. The chuck will not release the work, even if air line is broken, until operator actuates the draw bar. Skinner double acting rotating and non-rotating air cylinders are available for all sizes of Skinner power chucks, and for actuating all types of holding fixtures and tailstocks. Other Skinner accessories include hand operating valves —complete air unit including regulating valve, pressure gage and lubricator— filters — soft blank top jaws; draw bars —draw tubes, etc.



THE CREST OF QUALITY

**THE
SKINNER
CHUCK CO.
340 Church Street, New Britain
Connecticut**

SAVE ON DRILL SHARPENING and Drilling Costs—50%

BLACK DIAMOND

PRECISION DRILL GRINDER—FOR ALL SMALL DRILLS

This slender cuts grinding and drilling costs 50% and more, saves expensive drill stock, reduces work spoilage and drill breakage, conserves skilled labor.

When you need sharp, small gauge or fractional drills in quantities—it costs real money to put an experienced mechanic to work on grinding them.

WRITE FOR MORE COMPLETE DETAILS.

**BLACK DIAMOND SAW & MACHINE WORKS, INC.
45 NORTH AVENUE, Natick, Massachusetts**



With a Black Diamond anybody can keep all small drills sharp and ready for any job—with its accurate ground to exactness by the same laugh propulsive and with correct clearance for fast precision drilling. The built-in Diamond Point Dresser keeps the grinding wheel ever sharp cutting and the Web Thinning Attachment assures for all types of Notched points to perfection.

Metal-Working News in Brief

Norton Behr-Manning Overseas Inc., Worcester 6, Mass., has announced the appointment of **A. Donald Kelso**, executive vice president and director, as president, succeeding **Herbert A. Stanton** who has retired after serving over 40 years with the company.

— o —

Sub-Zero Products, Cincinnati 29, Ohio, has announced the appointment of **The Tucker Wilson Co.**, Roseville, Mich., as representative in Michigan; **Tidewater Supply Co.**, Columbia, S.C., as representative in South Carolina; **Mid-Continent Products Co.**, Chicago, Ill., as representative in Wisconsin; **The O'Toole Dodridge Co.**, Gardena, Calif., as representative in California; and **E & L Metcalf Co.**, Perth, Western Australia, as representative in all Australia.

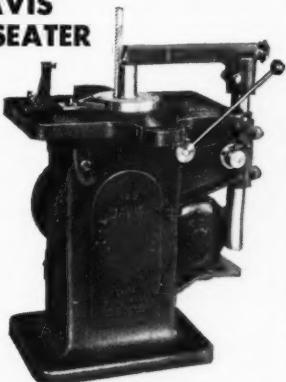


Why Use A Shaper to cut Keyways when a **DAVIS KEYSEATER**

will
do the
job so
much
quicker
and
better?
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DAVIS KEYSEATER CO.
Exchange and Glasgow Sts.
ROCHESTER, N. Y.



Cut Costs on Hole-Cutting! USE THE **NEW . . . BOREMASTER**

Finished holes
1½" to 11¼"
diameter to a
depth of 8" in
one rapid
operation on your
present equipment!



BOREMASTER is not just another Trepanning Cutter, but a real heavy duty tool. Stock is removed in one piece eliminating waste. Remember . . .

TIME SAVINGS + MATERIAL SAVINGS
= COST SAVINGS

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Mastertools for Modernized Machining
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It's the Grip that Counts . . .

ACME BENCH VISES will always grip your work securely without danger of Wobbling or Side Twisting. The even, central pulling action of the spindle assures uniform holding power for either light or heavy pieces. Acme Bench Vises are made in 11 sizes from 2" to 6".

**ACME COMBINATION PIPE AND
BENCH VISES**

Available with 3½" - 4½" or 5" Jaws.



ACME TOOL COMPANY

73 W. BROADWAY

NEW YORK 7, N. Y.

new shop equipment

Machine Is Designed for Grinding Large Cylindrical Workpieces

Designated as the Type C-2, a heavy-duty cylindrical grinder which is available as a plain or semi-automatic machine with an 18, 24, or 30-inch swing and a work length of 48, 72, 96, 120, 144, or 168 inches has been announced by Norton Co., Worcester 6, Mass. All controls for feeds and speeds can be adjusted at the front of the machine in the operating position, thus providing for quick machine setups.

The machine features a combination graduated wheel-feed handwheel and "click-count" indexing mechanism which readily indicates the amount of feed as the wheel is rotated past a fixed pointer and is said to permit settings of 0.0001 inch in work diameter instantly and without visual attention.

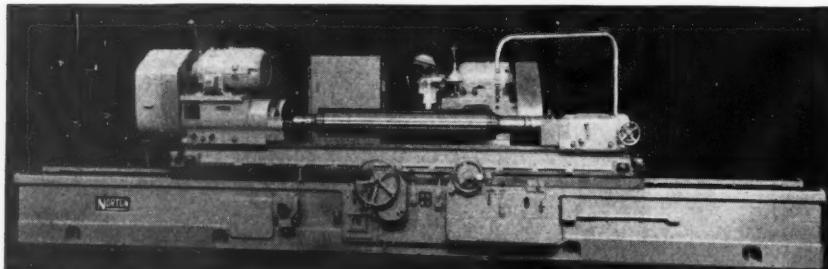
Further operating ease is said to be provided by a preset truing and grinding speed arrangement whereby the table speeds for truing and grinding

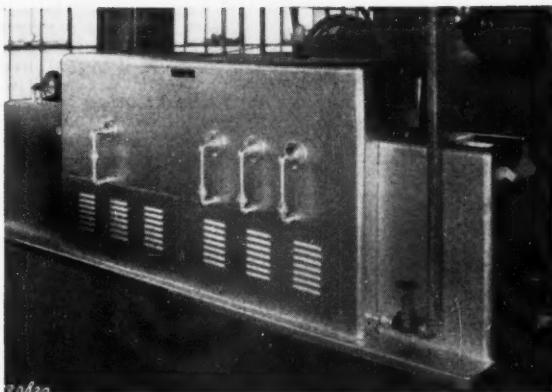
purposes are independently adjustable and preset, and either speed is immediately obtained when desired by movement of a combination selector and table start-stop lever. The machine also features automatic or manual control of work rotation and coolant flow, as well as separate dwell controls for each end of table reversal. An adjustable wheel feed which automatically resets the wheel head is provided at table reversals.

The wheel spindle unit houses pressure-lubricated bearings which enclose over 50 per cent of the wheel spindle body to provide unusual rigidity. Having minute oil clearance requirements, the unit is equally efficient for the finest finishing operations or heavy stock removal jobs without any bearing or oil pressure adjustment.

All pumps and motors, as well as filters, relief valves, way lubricant flow control valves, and oil reservoirs, are located outside the machine. Electrical controls are grouped in an elevated enclosure for maximum protection.

Norton Type C-2 Cylindrical Grinding Machine





Waltz Continuous Annealing Furnace

Furnace Anneals Brass Stampings Between Draws

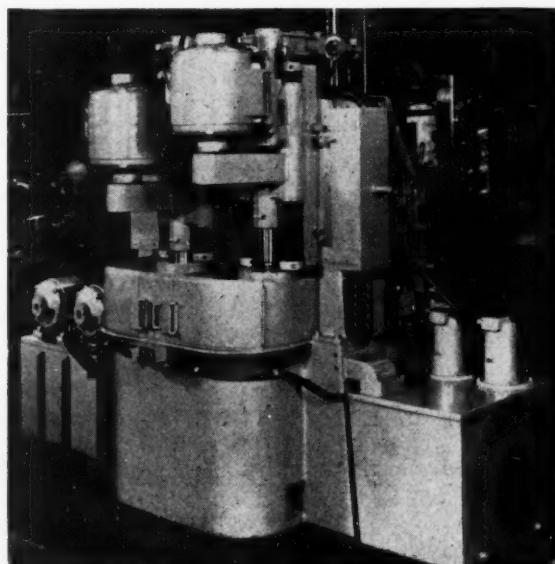
The continuous annealing furnace shown herewith, product of Waltz Furnace Co., Dept. D, 1901 Symmes St., Cincinnati, Ohio, is designed for annealing brass stampings between draws. The furnace is gas-fired by eight burners with individual mixers. A combustion blower control valve, gas regulator, and variable drive mechanism are mounted within the casting. The small rubber-tired wheel shown at the extreme left drives a belt by pressing the belt against a large ball-bearing mounted idler pulley. A temperature control instrument is provided on the loading section of the furnace, which can be built in various sizes and types for many different applications, including open-fired or controlled-atmosphere full muffler types.

Dual-Spindle Vertical Grinder

Springfield Machine Tool Co., Springfield, Ohio, has announced a

dual-spindle vertical grinder which features individually-operated spindles with separate controls which are not interlocked. The machine incorporates self-centering centrifugal chucks, as well as control buttons and switches which are duplicated for each of the two units.

When performing production operations, the left-hand spindle may be in operation while the right-hand spindle head is retracted for loading and unloading. A typical automatic cycle which is identical for the two production units of the machine includes rapid traverse until the wheel contacts the workpiece, at which time the grinding feed starts automatically. When the grinding operation on the workpiece has been fully completed (with final sizing and fine finish) the wheel head is quickly returned to the starting position.



Springfield Dual-Spindle Vertical Grinder

Improved Pneumatic Riveter Incorporates Spindle Designed to Minimize Impact Noise

Lemert Engineering Co., Plymouth, Ind., has added to its line of Airflex pneumatic riveters an improved model incorporating a new spindle designed to minimize impact noise and also featuring a rotating hammer, the blow of which can be carefully regulated as to force, rapidity, and duration, depending on the job. Thus, the machine is said to be especially desirable on jobs involving fragile materials or slender, unsupported rivets.

According to the manufacturer, the machine is designed so that as the peen rotates, only a small cross-sectional area of the rivet head is subjected to the force of each blow, with a result that bent rivets, improperly formed heads, flaking metal, loose joints, and broken or marred pieces are eliminated. Semi-automatic in operation, the machine is equipped with an air timing valve and is operated through a cycle in response to the touch of a foot pedal. The timing valve may be set for a series of impacts ranging in duration from 5/10 second to any designated length of time.

An adjustable nose is another feature of the machine. The force of the blow and the hammering speed may be regulated independently of each



**FOR QUALITY CONTROLLED
STAMPINGS
LET YOUR DECISION
BE PRECISION...**

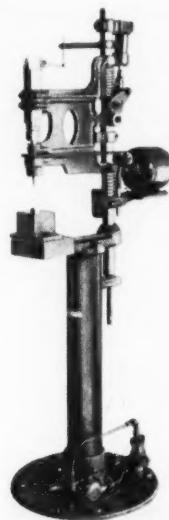


AUTOMATIC HIGH SPEED FLEXOPRESS

*Infinitely Variable from 150 to 600
strokes per minute.*

When you start stock through feed rolls . . . set so close to the dies . . . you SENSE and FEEL the superiority of a machine tool champion . . . KNOW time will be saved . . . ASSURED costs will be cut . . . RELAX knowing deliveries will be met . . . BUT COMPENSATED because your decision was PRECISION.

**PRECISION WELDER
& FLEXOPRESS CORP.**
138 E. McMICKEN AVE. CINCINNATI 10, OHIO



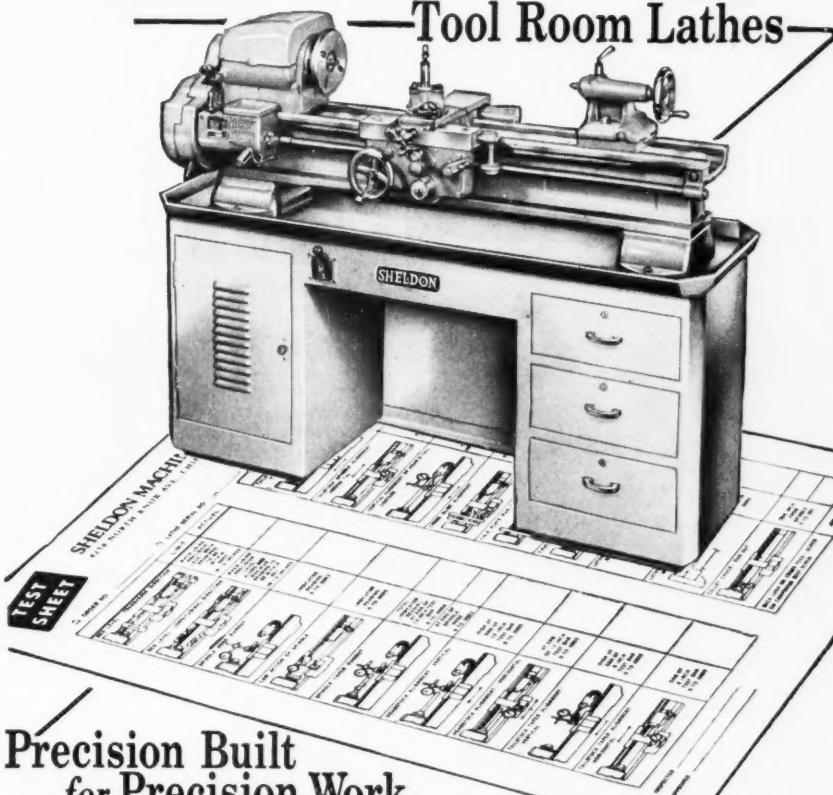
Airflex Improved
Pneumatic Riveter

other in ranges of from 5 to 80 p.s.i. and from 6,000 to 16,000 strokes per minute. The hammer impact is controlled by alternating the air pressure and by lengthening the gap

SHELDON

CHICAGO U. S. A.

Tool Room Lathes



Precision Built for Precision Work

Each SHELDON Lathe is a precision machine tool that in final inspection has passed the 19 accuracy checks on the SHELDON "Inspection Test Sheet."

Produced by modern

methods with the finest special machines, these 10", 11" and 12" (swings 13") lathes are quality built on a quantity production basis. Selling at quantity production prices they are today's best lathe values.

WRITE FOR CATALOG

SHELDON MACHINE CO., INC.

4250 North Knox Ave.,
Chicago 41, Illinois

between the piston head and the peening spindle. The riveter is available in two models; namely, standard vertical model (in floor and bench styles) for general riveting and a double-end model for the simultaneous heading of both ends of a rivet.

Four-Way Valve Is Pressure Operated

Hannifin Corp., 1136 S. Kilbourn Ave., Chicago 24, Ill., has announced the addition of a 4-way valve, designated as the Series BB, to its line of "Pilot-Master" valves. The Series BB 4-way valve is sim-

ply two Series B 3-way valves in one compact unit, with internal coring arranged so that one valve operates normally closed while the other operates normally open. According to the manufacturer, the two valves shift simultaneously when pressure is introduced to the chamber over the two piston-poppets. The pressure within the valve returns both piston-poppets to their normal position when pilot pressure is released, thus eliminating the need for springs or levers.

The main valve portion of the 4-way valve is available in $\frac{3}{8}$, $\frac{1}{2}$, and $\frac{3}{4}$ -inch sizes. The two piston-poppet assemblies are identical in all three sizes, both fitting in removable, replaceable cartridges which are identical with the cartridge used in like sizes of the 2

If you buy Cutting Tools



HERE'S
HELP
FOR
YOU!

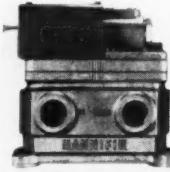
- TOOL BITS
- END MILLS
- MILLING CUTTERS
- CUT-OFF BLADES
- ALLOY CENTERS
- SLITTING SAWS
- INSERTED BLADE CUTTERS
- WEAR PARTS
- HIGH SPEED, CAST ALLOY, CARBIDE "SPECIALS"
- ROLLS
- ROTARY SHEARS

Do you buy or specify cutting tools and wear-resistant parts? You'll find this Gorham Tool Catalog a *helpful time saver!*

Its 120 pages are packed with useful cutting tool information . . . plus a valuable section of Engineering Data. Request your free copy on company letterhead. In *special* tooling problems, consult your nearby Gorham field engineer. His counsel is yours for the asking, and it's backed by Gorham's 35 years' experience in the design and production of fine cutting tools. Write for his name.

Gorham TOOL COMPANY
"EVERYTHING IN STANDARD AND SPECIAL CUTTING TOOLS"
14414 WOODROW WILSON • DETROIT 3, MICHIGAN

WEST COAST WAREHOUSE: 576 North Prairie Ave., Hawthorne 4, Calif.



"Pilot-Master" Series BB Four-Way Valve

and 3-way Pilot-Master valves. One size pilot head fits all three sizes of master valve.

The Series BB-2 pilot head valve, as shown in the accompanying illustration, employs the same solenoid used with the Series B-2 head for the 2 and 3-way valve, and uses the same light stressed stainless steel return spring. Speeds up to 600 cycles per minute are said to be practical with the combination. A series BB-4 pilot head with two solenoids for momentary contact operation is also available.

Simplify

LARGE
HOLE

Tapping

with the New Procurier
TAP KING

This lightweight, heavy duty tapping attachment was designed especially for difficult large hole tapping. Rugged, dependable, with a super-tap capacity of $\frac{3}{8}$ " to 1" in steel and up to $1\frac{1}{8}$ " in softer materials, the Tap King has been establishing production records. Many users report 50% production increases on large hole tap jobs and costly parts spoilage practically eliminated! And these are not isolated cases! Other users claim more spectacular daily production gains. Production men report amazing savings in parts spoilage and consistent, more accurate maintenance of uniform tap depth—even on large *blind hole* tapping jobs! Check these unique features:

Exclusive 17 tooth spline drive from clutch to tap holder spindle, gives smooth, powerful drive, increases tapping accuracy and reduces strain, wear and vibration; new, sensitive yet powerful friction clutch drives tap smoothly, with finger tip control—drastically reducing operator fatigue resulting in more work in less time with less effort; ball and needle bearings assure longer, trouble-free life; reverse speed is twice forward speed; simplified oiling system; aluminum housing; PLUS many other unusual features. Write TODAY for circular.

PROCURIER SAFETY CHUCK CO.,
12 S. Clinton St., Chicago 6, Ill. Dept. 11

Gentlemen: Please send me full details on the new Procurier "TAP KING" Heavy Duty Tapping Attachment.

Name _____

Address _____

City_____ Zone_____ State_____



NEW! LARGE!

"TRU-GRIP" Tap Holder
Makes tapping easier close to walls or shoulders, eliminates "chewed" tap shanks. Lighter, smaller in diameter, it drives the tap by the square, holds it true by the round.

Procurier
Safety Chuck Company

12 S. CLINTON ST. CHICAGO 6, ILL.

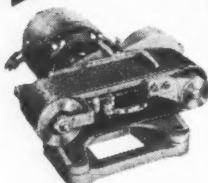
Bonding Agent Joins Dissimilar Metals and Non-Metallic Products

A unique bonding agent, "ChemoTec," especially formulated for joining metals to each other, to similar or dissimilar metals, or to non-metallic materials such as ceramic, glass, or wood, has been made available by ChemoTec Division, Eutectic Welding Alloys Corp., 172nd St. & Northern Blvd., Flushing, N. Y. The bonding agent, available in rod, powder, paste, and liquid forms, is claimed to pro-



In rod form, "ChemoTec" Bonding Agent is applied with a welding-rod technique, but at a much lower heat.

SIMPLEX-M ABRASIVE BAND GRINDER



matic band tension control. Nothing like it for finishing metals, plastics, wood, fibre, etc.

OTHER STYLES AND SIZES IN NEW
MANUAL ON FINISHING—WRITE TODAY

WALLS SALES CORP.

333 Nassau Avenue, Brooklyn 22, N. Y.

vide an effective method for the production joining of titanium, magnesium, aluminum, and similar difficult-to-bond metals.

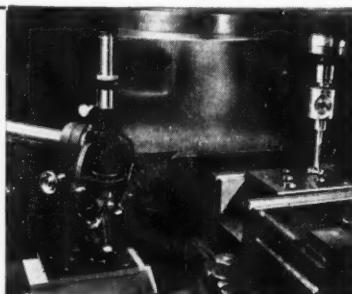
In rod form, the agent is applied with a welding-rod technique, but at a much lower heat, and tensile strengths in excess of 5,000 p.s.i. are said to have been obtained. According to the manufacturer, the agent bonds by capillary and chemical action and has high fluidity and unusual wetting characteristics that enable the thin-flowing material to penetrate all but sealed joints. The application of heat sets up a chemical reaction which changes the molecular structure and fuses or "Chemo-cizes" the bonding material. The process is claimed to provide a bond at the interface equal to the tensile strength of the bonding material itself.

JIG BORE . . . DO HOLE SPACING JOBS FAST

Optical Follower converts any vertical spindle miller into a jig borer. Accuracy .0002" guaranteed no matter what the error of the feed screws. Fastest hole spacing method known.

Use simple scribed template instead of jigs and dies. Inquire AIRMAIL.

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No. 1D indicator SHOCK PROOF, DUST PROOF. Graduated to read by .0005 of an inch. .4 of an inch capacity.

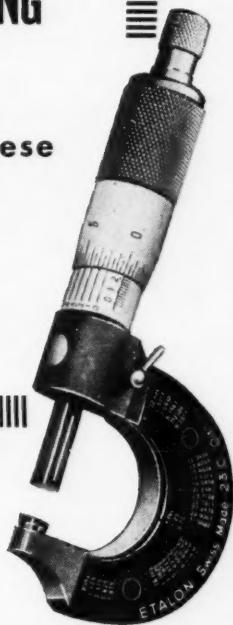
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**TOOL MAKING and
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**FINE MEASURING
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No. 23c micrometer FORGED FRAME, CARBIDE MEASURING FACES-READS to .0001 of an inch.

ASK YOUR DEALER
OR WRITE



ALINA CORPORATION

401 Broadway, New York 13, N. Y.

As is the case with thin-flowing brazing alloys, maximum strength is obtained from close-fitting joints, and a joint clearance of from 0.004 to 0.008 inch should be maintained. The part to be joined is broadly heated to approximately 250 to 300 deg. F. The rod acts as a temperature indicator, and sufficient material is applied to effect the joint. The high-wetability and thin-flowing characteristics are said to enable a high strength bond to be made irrespective of the metallurgical structure of the particular materials being bonded.

Copper-Clad Steel Is Rigid and Corrosion Resistant

Lukens Steel Co., 517 Strode Ave., Coatesville, Pa., has announced a copper-clad steel which is said to combine the specialized corrosion resistance and the electrical and thermal conductivity of solid copper with the strength, rigidity, and economy of steel. Furnished in plate form, the copper-clad steel is available in sizes up to 120 inches in width, 380 inches in length, and in thicknesses of from $\frac{1}{16}$ to $1\frac{1}{4}$ inches. Cladding percentages (normally specified as a percentage of the total thickness of the composite plate) can be 10, 15, or 20 per cent. The width, length, and thickness of plates available depend on the type of backing steel used, as well as the type and percentage of copper cladding desired. Two types of copper-clad steel regularly furnished are oxygen-free high-conductivity copper and phosphorus-de-oxidized copper for good weldability.

According to the manufacturer, Lukens Copper-Clad Steel has wide application in the electrical industry. The combination is also said to be a good heat-transfer material and can be used in evaporators, condensers, tube sheets, heat exchangers, hot water heaters, kettles, tanks, and pressure vessels.

Copper-clad steel is also available in the form of heads made to users' specifications in flanged only, standard flanged and dished, and elliptical dished types.

SAVE 3 WAYS WITH



CHECK THESE PRICES

Furnace	2000'	2300'
6x 6x12"	\$467.00	\$548.00
9x 9x18"	647.50	764.00
12x12x24"	912.00	1068.90
18x18x36"	1419.75	1629.50

Complete with 100% automatic electronic controls.

WRITE for FREE literature, specifications and price list of Lucifer Furnaces in wide range of sizes—top loading and side loading types. Engineering service and advice without obligation.

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Sole Manufacturers of Lucifer Electric Furnaces

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SHORTER CLAMPING GIVES
AVERAGE OF 70% MORE
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Compare these Features!

- Use Heavier Feeds — Higher Speeds on heavy-duty and extra-heavy-duty jobs.
- Fine thread screw adjustment is fast, positive and minute — far less than $1/16"$ required where serrations are involved.
- Simple design — only 5 parts. H.S. Steel Anvil replaceable at low cost. No exposed clamps to wear. Use only 1 wrench all adjustments.
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- Broached insert hole. Insert changeable without removing holder from machine.
- Solid Wessonmetal cemented carbide insert semi-standard with formed clearance angles. No slotted carbide to crack. No brazing of tips. Length of cutting edge constant.
- Offset Holder provides generous chip clearance.

WESSON COMPANY 1220 Woodward Heights Boulevard
FERNDALE (DETROIT 20) MICHIGAN

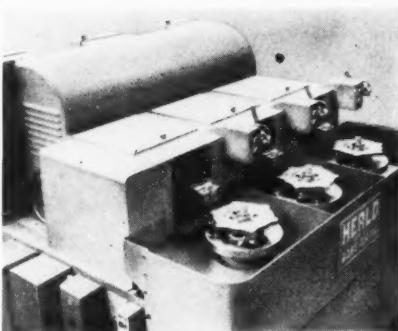
Affiliated with WESSON METAL CORPORATION, Lexington 34, Kentucky

WRITE
for
BULLETIN
521
TODAY

Boring Machine Provides for Continuous Clutch Plate Production

Identified as the Model 243 Bore-Matic, a vertical-spindle cam-operated three-station boring machine developed by The Heald Machine Co., Worcester 6, Mass., is designed to provide for multiple precision facing and step-facing operations on clutch plates, bell housings, flywheel assemblies, and other similar parts. The three stations may be set up for simultaneous or progressive production runs, and loading on any station may be performed while the other stations are operating. Also available for similar high production operations on a smaller scale are the Model 241 single-station and Model 242 two-station vertical-spindle Bore-Matics.

Cams operating the toolslides control the cutting speed of tools as well as the stroke; thus, depending on the number of different cams provided, a wide range of machine cycling is available. Tool adjustment is easily accomplished by setting index marked screws on the top of the tool blocks and may be effected while other stations are operating. The rotating air-operated fixtures are mounted on vertical-



Heald Model 243 Three-Station Bore-Matic

ly positioned boring heads with fixture clamp levers adjacent to each push-button control station. Chip removal is simplified by a worm or screw type conveyor which gathers chips at the base of each station, depositing them in a pan at the right side of the machine. Guarding around the toolslide is said to prevent chips from entering the cam operating section, and access doors at the top facilitate periodic inspections.



from 18 to 24 pieces per hour
Let us show you how!

BARKER (Two-Jaw or Three-Jaw) WRENCHLESS CHUCK

will pay for itself in 60 to 90 days on production schedules by giving MORE parts per hour at a LOWER cost per part. Most round parts can be set in the Barker Wrenchless Chuck without stopping the machine. It saves time, helps speed up production, and cuts spoilage where the run is continuous on turrets, engine lathes, cutting off machines, drill presses or any other type of chucking machine. The Barker Chuck shown here, replacing an ordinary 3-jaw chuck, jumped production hour. It can do it in your plant too.

Write for bulletin 201 today

— Chuck Division —

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MAGNI-FOCUSER's matched prismatic lenses give needle-sharp magnification. Comfortably light weight. Fits over regular glasses. Leaves both hands free. Normal vision may be resumed by lifting head.

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SPEEDS PRODUCTION

Leaves both hands free to work

Magni-Focuser—the binocular magnifier—reduces eye-strain and prevents squinting—thereby speeding production, increasing accuracy and minimizing the chance of errors and accidents. Gauge reading, layout work, inspection, tool and die work are just a few of the jobs that need the Magni-Focuser. Speeds precision assemblies, blue print work. Restores the usefulness of the skilled hands of many older workers whose vision needs a seeing aid.

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Reliable Distributors Wanted

Machine Bores, Locates, Drills and Reams Holes

The Wales DeLuxe Model Drilling Machine illustrated herewith, product of Wales-Strippit Corp., 398 Payne Ave., North Tonawanda, N. Y., is designed for the boring plus precision layout, drilling and reaming of holes. The machine is equipped with a heavy-duty boring head and tooling that permit the boring of holes up to 5 inches in diameter. In addition, the machine is designed for the easy locating, drilling and reaming of holes in material of practically any length and up to 36 inches wide.

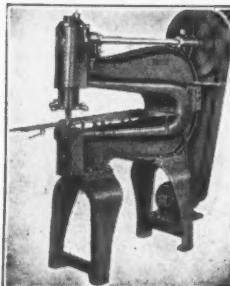
Detailed description: A vertical cylindrical device with various ports and components. Labels include 'DISCHARGE' at the top, 'AIR INLET' on the left, 'TO SEWER' at the bottom, and 'C' near the middle. The main body is labeled 'NEW MURPHY TRIUMPH AA SEPARATOR-FILTER'.

**NEW MURPHY TRIUMPH AA
SEPARATOR-FILTER**

This new unit will effectively drink up any moisture and oil as well as all vapors in your compressed air lines. Write today for complete information. Complete line of Aftercoolers, Separators and Traps.

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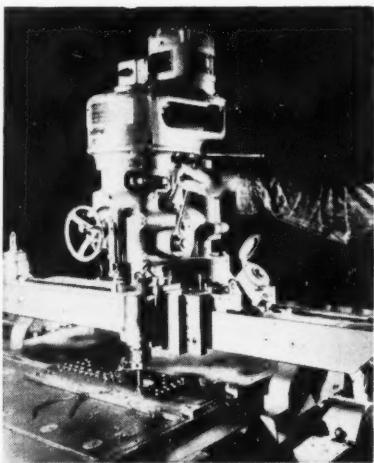
PIONEER MFRS. OF NIBBLING MACHINES

CAPACITIES

UP TO
3/4"

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"I"
—

The precision-built boring head with anti-friction bearings is equipped with an adjustable guide support that is moved



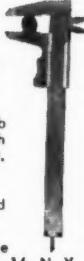
Close-up view of Wales DeLuxe Model Drilling Machine being used for boring operation

down close to the top of the work for precision accuracy during drilling and reaming operations. An extra large bearing area on the boring head assembly base is said to assure travel at exactly 90 degrees on two accurately ground ways across a solid bridge. Other features ensuring maximum precision and long life of the machine include the hand-scraped ways of the table. The work is firmly clamped to the long slide rail which moves in these hand-scraped ways and locates the work under the boring head. The full-size table provides complete support for the work. Easy movement of the work is provided

HELIOS VERNIER CALIPERS

MODEL 50E
6" Scale • Hardened Jaws
Guaranteed Accuracy

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Finest made! With automatic thumb lock... \$10.50. Also model 55A in inch and metric scales with set screw... \$9.50. Prices F.O.B. New York. Interesting proposition for dealers. For details on these and other imported precision instruments write us today!

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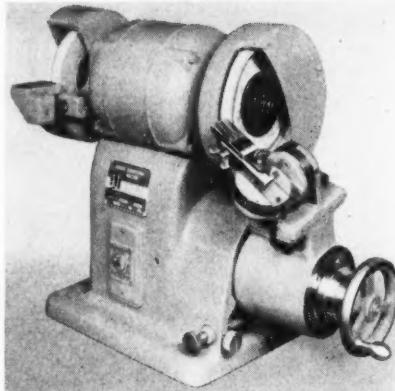
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BAY STATE
abrasive
engineer
to prove a
new peak of
performance
on your job
today!

by anti-friction ball inserts located over the entire table area.

Two speed gearing, controlled by hand-wheels, provides rapid traverse for rough positioning, and two built-in "Scan-A-Scales" zero-in the work to tolerances as close as one ten-thousandths of an inch. Air clamps rigidly lock both boring head and slide rail in exact position. Two sets of handy steel drawers are conveniently located in the base for holding boring tools, drills, reamers and other accessories. Four leveling screws on the welded base compensate for uneven floors.

Bench Type Machine Sharpens Tangent and Radial Die Chasers

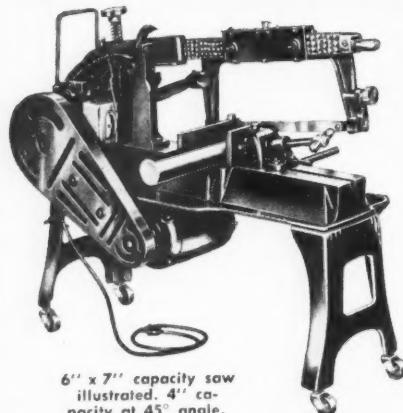
A universal bench type machine specifically designed for resharpening chasers has been announced by Jones & Lamson Machine Co., Springfield, Vt. Equipped with the new J & L chaser grinding fixture and adapters, the machine can be used for sharpening both tangent and radial die chasers. Adapters for J & L chasers are available from stock, while adapters for other chasers can be easily applied to the chaser grinding fixture.



Jones & Lamson Universal Bench Type
Chaser Sharpening Machine

Designed for easy operation by inexperienced operators, the machine, which requires a bench space of 14 x 28 inches, is equipped with all necessary stops and controls for duplicating desired grinds repeatedly.

SAWMASTER HACK SAW



6" x 7" capacity saw
illustrated. 4" capacity at 45° angle.

In every plant there is a large variety of uses for the SAWMASTER Hack Saw. Its self-contained portability, its low cost, and rugged construction to handle work in capacities of 6" x 6", 4" x 4", and 6" x 7" with 5 models make it an economical, accurate, efficient and versatile machine. Many superb features. All SAWMASTERS operate with efficient push-cut action.

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Bulletin 300.



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High Quality Work Since 1931.
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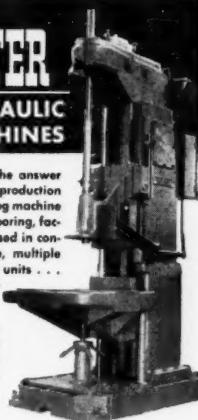
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VERTICAL HYDRAULIC DRILLING MACHINES

The DRILLMASTER provides the answer to a multitude of modern production problems. This precision drilling machine is ideal for drilling, reaming, boring, facing, and tapping . . . when used in conjunction with indexing table, multiple drilling heads and auxiliary units . . . many time consuming operations can be combined.

DRILLMASTER vertical hydraulic drilling machines are available in five models, 5 h.p., 7½ h.p., 10 h.p., 25 h.p., and 50 h.p.

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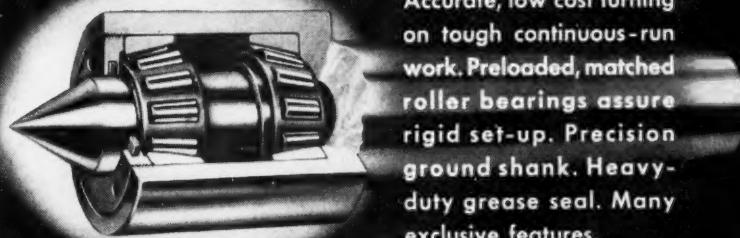


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& TOOL CO., LTD.
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...precision performance-ALWAYS!

Falls ROTO CENTER



for
lathe and grinder
tail stocks

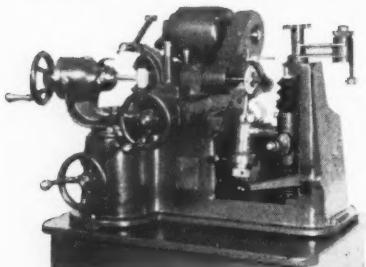


FREE BULLETIN 105

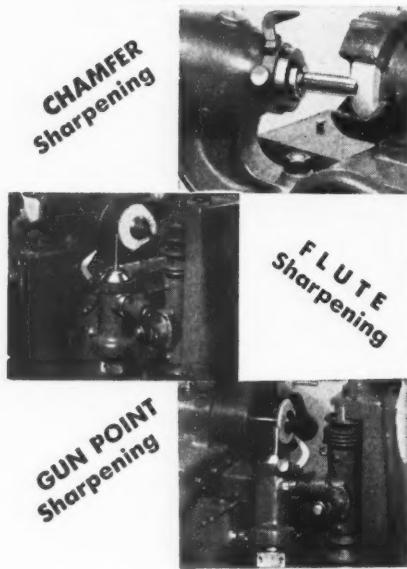
"What you should know
about LIVE CENTERS"

FALLS PRODUCTS, INC., 124 Genoa Street, GENOA, ILL., U.S.A.

HYBCO TAP GRINDER



MODEL 1100

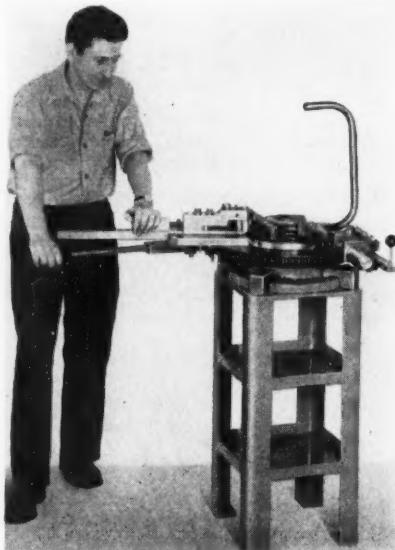


- Capacities No. 0 Machine Screw to 1½" Hand Taps.

Henry P. Boggis & Co.
708 East 163rd Street
Cleveland 10, Ohio

Manually Operated Bender Is Recommended for Heavy Forming Jobs

A hand-operated bending machine which is said to bend up to 1-inch-diameter cold finished steel bar and 1¼-inch tubing or their equivalents has been announced by O'Neil-Irwin Mfg. Co., 576 Eighth Ave., Lake City, Minn. Designated Di-Acro Bender No. 4, the machine is designed for heavy bending operations where production does not warrant a power driven ma-



Operator is shown bending 1¼-inch tubing on Di-Acro Bender No. 4 with ratchet mechanism

chine. It offers a radius bending from 0 to 12 inches.

A feature of the machine is a built-in ratchet mechanism which can be engaged or disengaged by the operator, depending upon the size of the material being formed. Engaging the ratchet mechanism increases the material capacity of the bender—larger and heavier size material can be bent—and multiplies the operator's effort by approximately four times. By disengaging the ratchet—operating the bender in direct drive—the operator can step up the production of lighter materials.

The Di-Acro Bender No. 4 can be quick-



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Twist Drills In All Popular Types, For Every Material, Are The Latest Additions To Butterfield's Line Of Taps, Dies, Reamers And Screw Plates . . . All 100% Inspected. Union Twist Drill Company, BUTTERFIELD DIVISION, Derby Line, Vermont. In Canada: Rock Island, Quebec.

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SEE YOUR NEARBY BUTTERFIELD DISTRIBUTOR FOR PROMPT DELIVERIES AND SERVICE

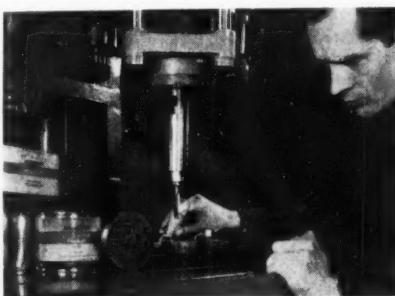
ly changed over from one forming operation to another. It provides a method of producing one or many simple or complicated parts without the use of dies. A special stand is available for the bender, as is a complete line of accessories for bending tubing, angle, channel, extrusions, moldings, strip stock, bus bars, round or square rods, and other solid, ductile materials.

Wax-Type Metal Cutting Oil Reduces Tool Wear

Known as "Wax-Cut," a wax-type cutting oil which is said to greatly improve metal cutting action and result in a marked reduction in tool wear has been developed by S. C. Johnson & Son, Inc., Industrial Products Dept., 1525 Howe St., Racine Wis. Designed for use in automatic screw machines, gear cutting machines, broaches, lathes, and other types of machine tools which use oil-type cutting fluids, the lubricant, according to the manufacturer, is free of all chemically active additives, will not stain non-ferrous metals, and will not damage machine bearings or gear mechanisms.

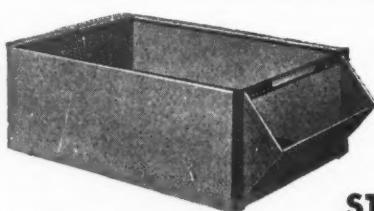
Golden clear in color, the product en-

ables the operator to observe the progress of his work through the fluid. Its lack of odor, the fact that it will not turn fancid, and its faculty of drastically reduc-



Technician is shown applying Johnson's "Wax-Cut" Metal Cutting Oil to steel samples during test for determining the amount of power required to tap $\frac{1}{2} \times 13$ threads

ing smoke are additional advantages that are claimed to make the oil particularly desirable for use by machinists.



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**F. O. B.
FACTORY
PHILA.**

**COMPLETE
CATALOG
ON REQUEST**

IMMEDIATE SHIPMENT

STYLE 500 STACKING BIN

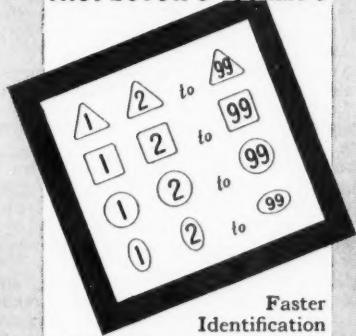
Perfect for handling small parts. Open front makes contents easily accessible when boxes are stacked. Rigid handle on back of bin. Will stack with style 600 stacking box of same length and width.

Product Number	Width	Length	Height	Gauge Steel	Price Plain	Price Green
501-18	10"	16"	6"	18	\$1.84	\$2.00
502-18	12"	18"	8"	18	\$2.51	\$2.80

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Faster Identification of Inspectors or Operators. Different borders may be used for different shifts. Available in 4 sizes. Write for prices today.

NEW METHOD STEEL STAMPS, Inc.

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FOR OVER 50 YEARS
MOLINE
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SPECIALLY
DESIGNED
**MACHINE
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HAVE CUT PRO-
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MOLINE, ILLINOIS**

DRILLING
BORING
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TAPPING and
Special Machines

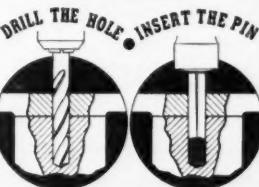
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WITH
GILLEN GROOVE PINS
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Threading • Tapering • Reaming

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Cut Fastening Costs—Save Time

Simple. Fast. Sure! Just drill the hole, insert the pin. Three longitudinal grooves expand the pin. It re-forms to shape of hole when inserted. GILLEN GROOVE PINS hold tight; yet they remove without damage to holes. GILLEN PINS improve assembled appearance. Millions are used by industry to do a better job at lower cost. Investigate GILLEN GROOVE PINS for your production line.

Here's How Easy GILLEN
GROOVE PINS Do It:



Put 'em together... FAST

Speed assembly time uniting fixed or moveable members. Five types of GILLEN PINS meet nearly every fastening requirement.

Keep 'em together... SECURE

GILLEN GROOVE PINS fit tight at every point of hole circumference, making safe, positive anchorage, not affected by vibration or shock.

Take 'em apart... EASY

For replacement or repair, simply tap out the GILLEN PIN, re-use it. B-1112 and C-1010 zinc plated steel used. Also available in other metals, or plated to specifications.

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Get them from GILLEN—SEND THIS COUPON
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Send sizes and prices on Gilen Groove Pins

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Attack this to your letterhead

TRY FREE SAMPLE PINS
Specify approx. Diam. and Length Wanted

2542 S. 50th Ave., Cicero 50, Ill.



TYPE "A"



TYPE "B"



TYPE "C"



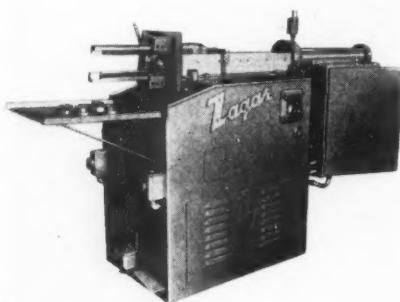
TYPE "D"



TYPE "E"

20-Inch Broaching Machine Is Pedal Operated

Known as the "Hyspeed," a fast-operating 20-inch broaching machine an-



Zagar "Hyspeed" 20-Inch Broaching Machine set up for broaching slots simultaneously in shell fuse assemblies

nounced by Zagar Tool, Inc., 24000 Lakeland Blvd., Cleveland 23, Ohio, is arranged so that the operating cycle is started with

a foot pedal, thus leaving both hands free to handle the work. The "start" pedal is double-sided so that the machine can be operated on either side for the convenience of the operator on the job. Two emergency "stop" switches permit the machine to be stopped quickly either with knee or hand.

The machine is hydraulically operated and electrically controlled through a system built to J.I.C. standards. The electric control panel has a selective switch which determines an automatic return stroke or the conventional broaching stroke which stops at the end of each cutting stroke. The coolant system, built integral with the machine, pumps either light or heavy cutting solvents at considerable volume.

Said to be ideally suited to the high production broaching of specialized medium and small jobs such as splines, wrench slots, internal wrench hexes, hole sizing, and so on, the machine has a maximum pull of 6,000 lb.; maximum feed stroke that is variable between 2 and 27 f.p.m.; and full return stroke of 20 inches that requires 1½ seconds. The unit occupies a floor space of 3 x 9 feet and is said to cycle at a rate of 700 strokes per hour.

A BETTER BORING BAR

OUR fine list of Customers is PROOF that our method of broaching square holes makes a better fit for the tool bit. This means more rigidity and longer life especially with tungsten Carbide. We also make bars for our Type B and Type C cutters or a combination of tool bits and cutters. Bars are made to suit customers' requirements as to method of drive, pilot, number of holes, angle of bit, etc. Our two-bladed cutters can be floated in the bar or held rigidly. Cutters are interchangeable—hence can be ground in an arbor in the tool room and only require a few seconds for inserting in the bar. Square hole sizes range from $\frac{3}{16}$ " up to and including $\frac{3}{8}$ ".

THE DETROIT BORING BAR CO.
688 E. FORT ST. Detroit 26, Mich.

Established



1937

TYPE "B" AND "C" CUTTERS

Suitable for Tipping With Tungsten Carbide



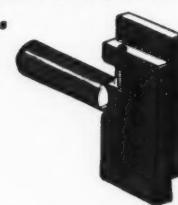
"B" A strong rigid serrated 2-bladed cutter—located in the bar with a taper pin. Bores holes accurately to close limits. Can be expanded and reground giving long life. Sizes $\frac{3}{16}$ " dia. up to 6".



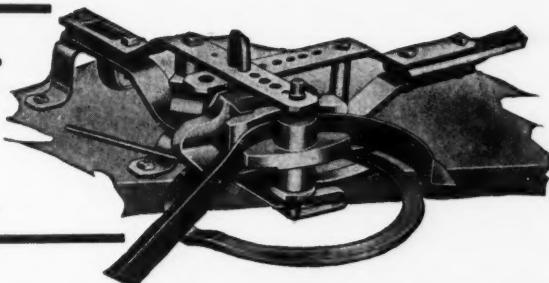
"C" A simple 2-bladed reaming cutter. Can be expanded and reground. Located in the bar by a hardened V. This V never has to be reground as blades are expanded.



Fits other
bars with slots
 $\frac{3}{16}'' \times \frac{7}{16}''$
 $\frac{1}{2}'' \times \frac{1}{2}''$
 $\frac{5}{8}'' \times \frac{11}{16}''$
 $\frac{5}{8}'' \times \frac{13}{16}''$



**ONE MAN...
bends 2" x 2" x 3/16"
Angle Iron
EASILY ...**



**with the . . . HYDRAULIC POWERED
HOSSFELD UNIVERSAL IRON BENDER**

Hydraulic unit provides plenty of bending power at your fingertips for smooth effortless bending. Reduce hand labor . . . speed up work . . . improve quality of bends. Fast and accurate, the Hossfeld Hydraulic Bender handles rounds, flats, pipe and angle iron. Forms rings, coils, "U" and "S" bends, eyebolts, spring eyes, etc. Gain higher production with lower labor costs.

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HOSSFELD MANUFACTURING COMPANY

DEPT. MMS • WINONA, MINNESOTA

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**No. 60 FLANGED MILLING MACHINE VISE
THE POPULAR VISE PRODUCTION MEN ARE RAVING ABOUT**



**PRICE
ONLY. \$54.45**

End Your Production Worries

Standardize your shop with this modern heavy duty milling machine vise and your production worries are over for good.

It's the ideal vise for Milling, Drilling, Grinding, Planing, Shaping, etc. Provided with both slots for clamping down to the table of the various machines. It is equipped with hardened and ground steel jaws, 6" wide, 2" deep, opens to full 6". You'll say it's the sweetest job you ever saw and like many leading shops now using them, you, too, will profit by lower production cost and more efficient work. Order today from your dealer or

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CHICAGO TOOL & ENGINEERING CO.

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8399 South Chicago Avenue

Chicago 17, Ill.

Heat Exchanger Tube Features Longitudinal Butt-Welded Design

A heat exchanger tube which is made by longitudinal butt-welding Alclad 3S-H12 aluminum alloy sheet has been announced by Aluminum Company of America, 1950-J Gulf Bldg., Pittsburgh 19, Pa. The welded tube, it is claimed, has a tensile strength of 17,000 p.s.i. and a yield strength of 14,000 lb. per square inch.

During manufacture of the tube, the outside weld bead is removed and the small inside bead is flattened. An alclad

coating on the inside and outside of the tube affords substantial protection to all surfaces, including the weld area. The tube is available in two standard sizes: namely, 1-inch outside diameter x 0.049-inch wall thickness and 1-inch outside diameter x 0.065-inch wall thickness. Standard lengths of the tubing are 12, 14, 16, and 20 feet; however, other lengths between 10 and 24 feet are available on special order.

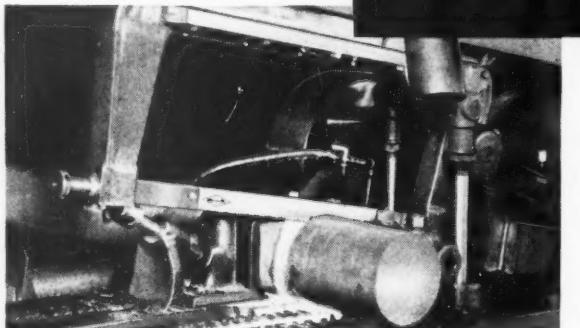
Toggle Clamp

Designated as the No. 801 "Fast-Grip," a toggle clamp which is said to have a normal working force of 400 lb. has been announced by Robert J. Kelly Mfg. Co., P. O. Box 61 (Broadway

BARNES GIVES YOU THE BEST IN POWER BLADES



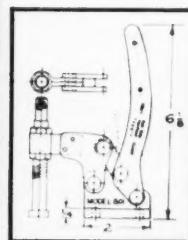
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Every Barnes Power Hack Saw blade is individually Rockwell tested to assure you the fine quality for which Barnes blades are famous.

Your Industrial Distributor will help you select the best blade for your job.

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BARNES
ESTABLISHED 1919
W. O. BARNES CO., INC.
1297 TERMINAL AVE. • DETROIT 14, MICH.



Dimensional drawing
of Kelly No. 801 "Fast-Grip" Toggle Clamp

Sta.), Newport, R. I. The clamp, it is claimed, can be mounted either horizontally or vertically, and the toggle bar may be set at any angle.

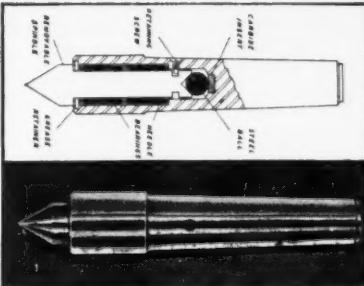
According to the manufacturer, the clamp is designed primarily for use in a wide variety of light duty work on aircraft, automotive equipment, machinery, and furniture when clamping parts for inspecting, grinding, and various other mechanical operations.

Small head—no chatter

WEE LIVE CENTERS

Exclusive SMALL HEAD design of WEE Live Centers combines live center advantages with size and accuracy of dead centers. 30 to 40% less overhang means deeper cuts, faster speeds, no chatter. Runout held to .00015. Used by hundreds of leading concerns. No. 2 M.T., \$21.00. Request complete price list.

HERBERT CROSS & SON, Bala-Cynwyd, Pa.



SAVE ON PRODUCTION TOOLING COSTS with

CARDINAL -SPEED VISE-

The exclusive, quick-acting clamping mechanism of SPEED VISE accommodates a wide variety of parts.

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Drill jigs are simpler, smaller and cheaper when
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SIZES
300" to 6,000"

The original indicator gage designed for measurement of internal groove diameters

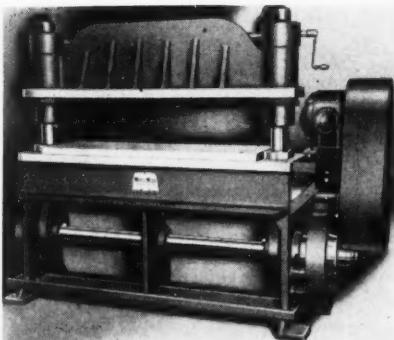
For Information Write To

RIMAT TOOL CO. • 23 West Dayton Street, Pasadena 2, Calif.

Punch Press Has Unusually Large Bed and Ram Area

The Diamond Machine Tool Co., 3429 E. Olympic Blvd., Los Angeles 23, Calif., has added to its line of "Multi-Max" punch presses the Model 3060, illustrated here-with, which features a bed size of $15\frac{1}{2} \times 61\frac{1}{4}$ inches and a ram size of $10 \times 60\frac{3}{4}$ inches. The press is of all-steel welded construction and is capable of providing 80 strokes per minute.

The press can be obtained with a maximum shut die height (to order) of 24



Diamond "Multi-Max" Model 3060 Punch Press



inches. Other features incorporated in the press include a positive brake and counterbalance with exclusive equilibrator, a four-point electrically-operated engaging clutch, and herringbone gears.

High Speed Plunger Features Light Spring Pressure

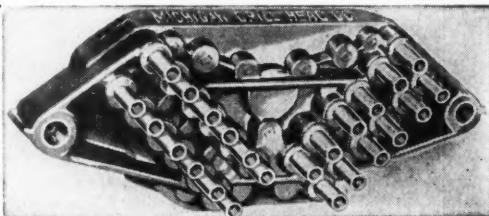
Known as the "Silvertip," a high speed spring plunger developed specially for high speed automatic punch presses and other machine tools has been announced by Vlier Mfg. Co., 4552 Beverly Blvd., Los Angeles 4, Calif. Designed specifically to meet the needs of machine tool operators where repetitive usage and high speed production are constant, the plunger is identified by a brightly finished cadmium plated plunger end and has lighter spring pressure than standard Vlier spring plungers, providing for long spring life with minimum breakage under fast flexing. The plunger end is rust resistant and case hardened, and telescopes completely into the plunger body, which has

Pictured: a 24-Spindle Heavy-Duty Drill Head.

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OF MULTIPLE DRILL-
ING EQUIPMENT.

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An accurate, inexpensive and portable machine for engraving name plates and panels, forming small molds and dies, and profiling small parts.

Geometrically correct for true three dimensional work. Accurately duplicates master copy in metals, plastics or wood. Rugged, sturdy construction.

COMPARE THESE SUPERIOR FEATURES

- Engraves in 2 or in 3 dimensions.
- Pantograph permits 4 reduction ratios.
- Micrometer depth control graduated in thousandths of an inch.
- High speed, ball bearing spindle.
- Chuck $\frac{1}{8}$ " to take variety of small tools, burrs, mounted points, as well as standard cutters.

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73 Trowbridge St.

Cambridge, Mass.

The BARKER "MILLER"

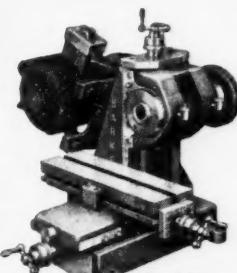
Will Efficiently Handle
"101 TRICKY"

Second Operation Jobs
on SMALL PARTS
ordinarily requiring
larger, expensive
milling machines



The Barker exclusive 3-way travel feature affords versatility of operation.
Rapid production rate with inexperienced help. Easy set-up for small run jobs.
Compare Barkers "plus" features with other small "millers," then decide.

TYPICAL END
MILL OPERATION
UTILIZING HEAD
MOVEMENT ONLY



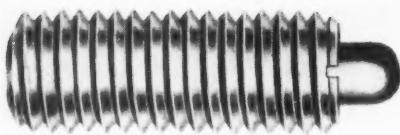
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Model
3 Micrometer
feed screws.
Ideal for instru-
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tool and die
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BARKER ENGINEERING COMPANY

500 GREEN ROAD
CLEVELAND 21, OHIO



Vlier "Silvertip" Spring Plunger

a national coarse Class No. 1 thread to prevent "freezing" in the fixture.

The Silvertip Plunger is available in lengths from $\frac{1}{2}$ to $2\frac{1}{4}$ inches with spring pressures from 1 to 6 pounds.

Magnetic Base Set

For toolmakers, set-up men, inspectors, and machinists, Chicago Dial Indicator Co., Dept. B, 180 N. Wacker Dr., Chicago, Ill., has announced the Geneva Magnetic Base Test Set for fast accurate readings in contour, dimension, or roundness. A 100-lb. pull Alnico permanent magnet in the base permits the test set to be positioned quickly on flat or curved surfaces. A flick of the finger releases the magnet, and the set can be removed or positioned without jarring the indicator.

The test set is available in three models, all finished in machine gray. Each set includes a magnetic base, a holding rod, $\frac{3}{8}$ inch in diameter x 8 inches long, and a Geneva Dial Indicator with center lug back, $\frac{1}{8}$ inch in diameter x 6-

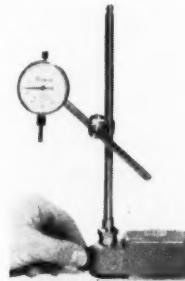
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as small as .002"

LEVIN®

MICRO-DRILL PRESS

Designed to hold small drills in precision collets. Absence of a sliding quill guarantees extreme sensitivity with finger-tip control. A mounted $\frac{1}{8}$ " capacity drill chuck can also be used.

Write for Bulletin H describing the Micro-Drill Press and listing collet sizes. Louis Levin & Son, Inc., 782 E. Pico Blvd., Los Angeles 21, California.



Geneva Magnetic Base Test Set

inch long holding rod, and knurled screw. The Model M-25 has a 125F Geneva dial indicator with dial graduated to 0.001 inch; the Model M-25 has a 135F indicator with dial graduated to 0.0005 inch; and the Model M-45 includes a 145F indicator which measures to 0.0001 inch. Magnetic bases may be obtained separately or with dial indicators. Each set is supplied packed in an attractive wood box.

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TO FIT MOST MAKES OF
PUNCH MACHINES

Large range of round, square, flat, and oval sizes are carried in stock for immediate shipment. Special tools are made to order.

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MACHINES**

Send For Bulletin C 1

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Oblique rays make scratches and defects stand out clearly.

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Removable lens housing for inspection of large surfaces, engines, etc.

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Consistent performance regrind after reground!

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When in need of the best in Carbide tools remember to specify "NORTH-WEST"!

Tips are full-sized, uniformly brazed, have sturdy shanks and diamond ground cutting edges. Tipped with Carboloy cemented Carbide.

Precision built flat, single point, carbide cutting tools.

Carbide cutting tools made to your own specifications. Distributors in all leading cities.

Write for catalog.

THE NORTH-WEST TOOL COMPANY, 8 North Kilmer St., Dayton 7, Ohio



**KEY
SEAT and
DOVETAIL
CUTTERS
by Reltool**
**Shank and
Arbor
Types**

- Woodruff Key Seat Cutters by Reltool are furnished in both Shank and Arbor Types. Right Hand Cut, shank type, carried in stock; Left Hand Cut, special. Arbor Type Keyseat Cutters have staggered teeth, with side teeth relieved for narrow margin.

- Reltool Dovetail Cutters, Shank Type, are designed to take the place of arbor type and threaded hole angle cutters . . . for use in Reltool End Mill Holders.

The **RELTOOL Line Includes:** Combined Drill and Countersinks • Cut-off Blades • Die Sinking Cutters • Dovetail Cutters • End Mills • End Mill Holders • Hollow Mills • Key Seat Cutters • Lathe Centers • Lathe Mandrels • Machine Countersinks • Metal Slitting Saws • Milling Cutters — all types • Screw Slotters • Tool Bits • Specials.



Reltool CORPORATION
RELIABLE METAL CUTTING TOOLS

4540 W. BURNHAM ST. • MILWAUKEE 46, WIS.

A 5954-1/2-R

Magnifying Device for Micrometer

The accompanying illustration shows the improved Magna-Eye for micrometers



Stebar Improved Magna-Eye mounted on a micrometer

which is now being manufactured by Stebar Co., 711 W. Lake St., Minneapolis 8, Minn. One of the improvements made in this magnifying device is the location of five beads in the inside of the collar to assure proper fitting to micrometers, especially those with full finished frames. These beads are intended for dressing down to exact fit.

Another improvement in the device is the change in the curvature of the magnifying element which is said to make it quicker, and more accurate to read.

Abrasive Polishing Belt Is Coated with Cork

Designated as the 3M "Wetordry" Brand, an abrasive polishing belt which is coated with granulated cork rather than



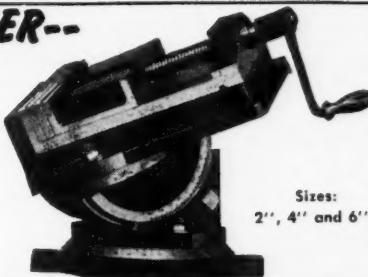
3M "Wetordry" Brand Cork Abrasive Polishing Belt

MAKE SET-UPS ***FASTER--***

Conserve valuable production time by using the fully universal, easily-operated MASTER MULTI-SWIVEL VISE for intricate, angular set-ups in your shop. Three swivels instantly set any compound angle. Used in shops throughout the world. Interchangeable platen optional.

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80 BATTERY MARCH ST., BOSTON 10, MASS.



Sizes:
2", 4" and 6".

PRODUCTION INCREASES... with TROYKE ROTARY TABLES



Sizes:
9 - 12 - 15 - 18 - 21 - 25.

Troyke Mfg. Co.,



See your dealer or write for Catalog No. 17, fully illustrated, showing all models and applications to various work.

Dividing Attachments can be furnished for all models of Wormwheel operated Rotary Tables except the Model BH-9.

Cincinnati 9, Ohio, U. S. A.



your inspection department records will show that parts tapped with "Auto-tap" are consistently free from rejects . . . drives the tap and takes the load . . . your taps last much longer

Excellent for production tapping
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"PRECISION PARTS FOR THE AIRCRAFT INDUSTRY"

eliminate your tapping problems..

with "Auto-tap"

the new lead screw
tapping attachment



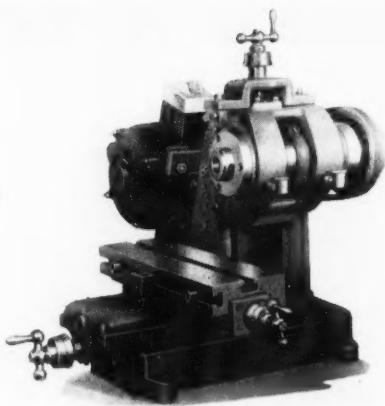
42 Walnut St., Bldg. 188, Newark 2, N. J.

the usual mineral grains has been announced by Minnesota Mining & Mfg. Co., Dept. MMS 652, St. Paul 6, Minn. Designed primarily for use on glass, the belt can also be used on ceramics, metal, and plastics.

The cork surface of the belt is sized with resin combined with a polishing agent that is said to provide maximum polishing action. The belt includes a waterproof cloth backing; therefore, water is recommended as a lubricant in glass grinding operations and oil or grease for use with metal. According to the manufacturer, the belt can be used with the regular abrasive grit sequences in grinding and polishing processes, and is available in a single universal surface in all standard sizes for abrasive belt grinding and polishing equipment.

Bench-Type Miller Is Designed for Small-Run Precision Work

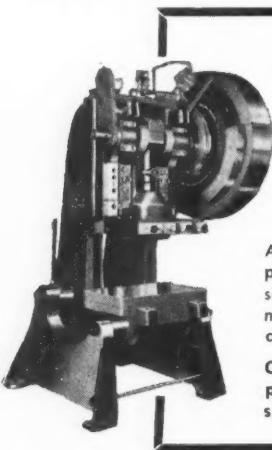
An improved toolroom-model bench-type miller which is said to be ideal for handling small-run precision jobs has been announced by The Barker Engineering Co., 500 Green Rd., Cleveland 21, Ohio. The machine features micrometer feed screws and three-way travel. Head



Barker Improved Toolroom-Model Bench-Type Miller

travel is $3\frac{1}{4}$ inches; table travel is 5 inches; and saddle travel is 3 inches. All travel movements can be locked if desired.

The machine is said to be easily set up and changed over for work with different tools and fixtures. High spindle speeds permit the use of carbide cutters.



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PRESS-RITE
POWER PRESSES

AIRFLEX CLUTCH AND BRAKE SYSTEM provides full flywheel power to press . . . quick! No waiting for keys to find flywheel slots. Steps up press production. Automatic adjustment eliminates maintenance. Electric operating controls are fast and dependable. Convenient and trouble-free, too!

Capacities from 5 to 85 tons. More features give you more press value. Let us mail you Bulletin P552 with complete specifications.

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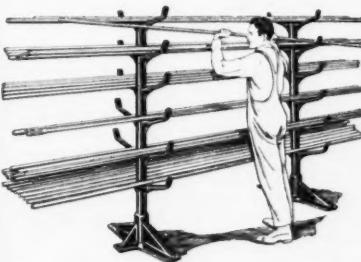
For Tool, Die, Pattern or Template layout on metal . . . Quick identification of bar stock, sheets, strips or parts . . . Shows up in sharp relief—dries instantly . . . Write for sample and circular on company letterhead.

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STOCK-ROOM SERVICE

The BROWN SECTIONAL RACK saves the time previously lost in end-hauling each bar of stock its entire length from the old-style, closed-side Rack, the Brown Rack requiring but a few inches of side movement. Each length, width and thickness of stock is displayed in gold-fish visibility for instant selection. Workmen waiting for stock are served without waste of time.



Any time you require additional storage space, all you need do is add more units. If you want to relocate it at any time, you can do so quickly for it is unattached to the building.

It is a simple, durable article made of metal in five styles. It can't burn, warp, sag or twist; depreciation is practically nil. SEND FOR BULLETIN No. 26-B DESCRIBING

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BROWN ENGINEERING CO.

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Universal Drill Bushings are produced in a complete range of standard sizes and lengths. Prompt attention is also given to orders for special dimensions. Universal Drill Bushings are precision machined with super finish bores to reduce wear and a blended radius to keep tool hang-up and breakage to a minimum. 100% concentricity and hardness tests insure absolute accuracy, uniform high quality, and long life. Write today for complete information.



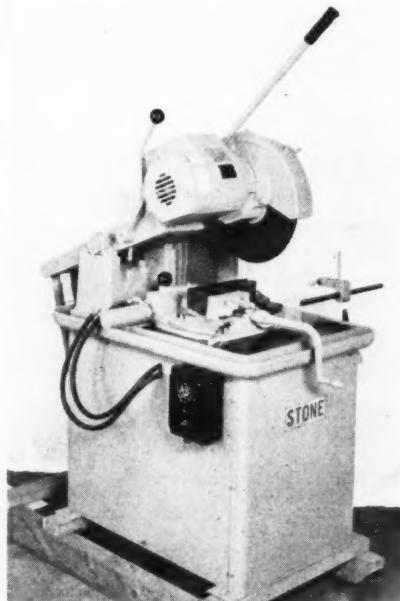
167-B

The modern home of finer production tools

UNIVERSAL ENGINEERING COMPANY
FRANKENMUTH 9, MICHIGAN

Cut-Off Machine Is Designed for Continuous Cutting of Metals

Identified as the M75, a cut-off machine designed for the heavy, continuous production cutting of all ferrous and non-ferrous metals has been announced by Stone Machinery Co., Inc., 643 Fayette St., Manlius, N. Y. The machine includes



Stone M75 Cut-Off Machine

a $7\frac{1}{2}$ h.p. cutting head which allows for continuous production cutting. A work stop and air activated vise are available as extra equipment to provide for increased production.

Dresser Improves Coated Abrasive Belt Performance

Fast stock removal, unusually long belt life, and up to 75 per cent increase in total stock removal during belt life are results which are claimed to be obtained by the Desmond Beltbrasive Dresser announced by the Desmond-Stephan Mfg. Co., Urbana, Ohio. When contacting abrasive

**THREAD MEASURING MADE EASY
WITH NEW 60° THREAD TRIANGLES**



Quickly checks all 60° standard and special threads from 4 to 56 pitch... ANY O.D. No "fancy" calculations... just add a constant to O.D. That's all. Comes complete with chart.

FREE 10-DAY TRIAL.
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Any decimal diameter to $\frac{1}{8}$ " — in any length. Mirror finish surface to gage tolerance. Many uses — punches, gages, measuring wires, special tools, etc. Quick delivery.

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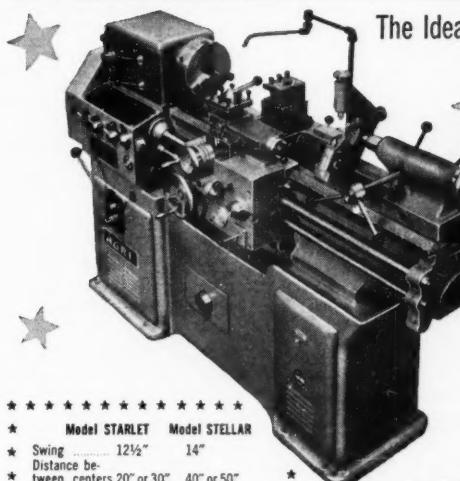
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- New versatile long stroke standard models cost less.
- Anyone can operate flexible presses productively in a few hours. You can actually feel the pressure and know instantly how much to apply. TRY ONE BEFORE YOU BUY.
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General MANUFACTURING CO.
6433 FARNSWORTH DETROIT 11, MICHIGAN

The Ideal LATHE for Toolroom or Production



RUGGED!
DEPENDABLE!
VERSATILE!

IMMEDIATE DELIVERY • NO PRIORITIES!

Built with truly rugged construction, this machine fills all the requirements of a heavy, dependable lathe. The headstock has a heavily ribbed and crossbraced body, and special chrome nickel steel is used throughout at strategic points . . . features that add to the rigidity and top quality of the AGRI.

The multi-Vee belt (TEXROPE) transmission is specially designed to ensure high production rate—particularly at low speeds—and all moving parts run on ball bearings and in an oil bath.

Combining the 9 speeds of the gear box with the spindle-gear reduction gives a wide range of 18 speeds . . . covering practically every requirement.

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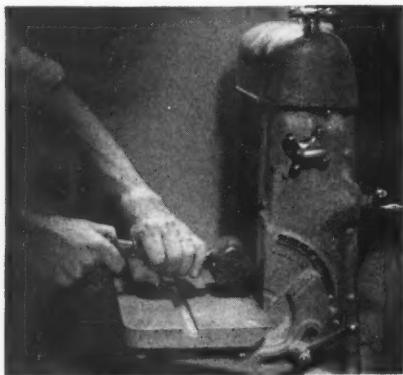
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TELEPHONE: CANAL 6-7400 • CABLE: WOODROW, N.Y.



Desmond Beltbrasive Dresser in use

belts in motion, the dresser cutters remove glazing and loading from the belt and expose a maximum amount of particles, thus providing for effective grinding, sanding, or polishing operations.

In actual use on abrasive belt grinders, Sanders, and polishers employed on metal and plastic parts, the Beltrbrasive Dresser

has been found to substantially increase belt life and to also minimize belt changing.

Pneumatic Drills, Screw Drivers, Nut Setters, and Grinders Feature Lightweight Construction

Known as the "Thor" No. 2 Class, a line of lightweight pneumatic drills, screw drivers, nut setters, and grinders has been released by Independent Pneumatic Tool Co., Aurora, Ill. Ranging in weight from a 1-lb., 1-oz. grinder to a 2-lb., 11-oz. angle screw driver, the Thor No. 2 tools feature interchangeable housings, handles, and attachments and are each equipped with a rotary air motor which is said to provide maximum power output at standard air line pressures.

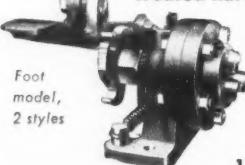
In the drill line, 31 sizes are available, including angle attachment models in 30, 45, and 90 degrees, as well as straight models. A choice of offset (pistol) grip, button or lever throttle and optional chuck or collet is offered. Speeds range from 850 to 14,000 r.p.m. for drilling in aluminum, with nine different speeds.

The screw drivers and nut setters are made in 48 sizes—28 of which are angle

Nicholson Control Valves

SET NEW HIGH in Slow Wearing

Featuring specially treated hard



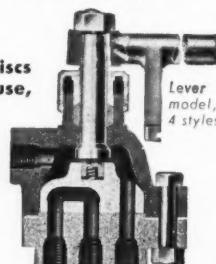
Foot
model,
2 styles

seats and lapping flat discs that become tighter with use, Nicholson control valves are setting records for long wear and leak-free service. Choice of 6 metal combinations to meet

CATALOG 552

136 Oregon St., Wilkes-Barre, Pa.

specific needs. Lever, foot, solenoid, motor types for air, gas, steam, oil, water, etc. Size $\frac{1}{4}$ " to $2\frac{1}{2}$ "; press. to 5,000 lbs.



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TRAPS · VALVES · FLOATS

USE ECONOMY

Headless
Set
Screws

Socket
Set Screws



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Stop and Shop at Rivett's production corner

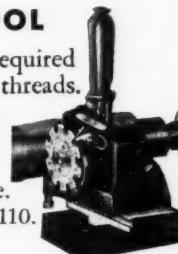
DRAW-IN COLLETS

Stocked in all standard
styles...checked 25 times
against master gauges...
guaranteed to run "dead
true" at collet mouth.
Write for Bulletin 100.



THREAD TOOL

No operator skill required
to produce perfect threads.
Duplicates threads
without gauging.
Mounts on any
screw-cutting lathe.
Write for Bulletin 110.



LOCKJAW

Set-ups stay put! Grips
both downwards
and sideways...
eliminates bolting
and clamping. Used
on all table top machine
tools. 2 sizes available.
Write for Bulletin 140-A.



RIVETT LATHE & GRINDER, Inc.
Dept. MMSA-11
Brighton 35, Boston, Massachusetts

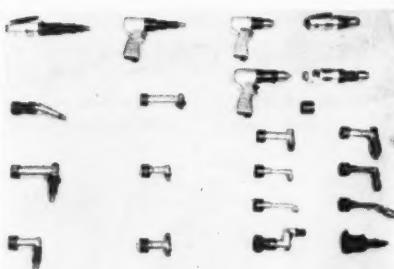
Economy TOOLS KEEP YOU AT TOP PRODUCTION WITH MINIMUM COST



Your job can be no better than the tools applied in the making. You'll find that ECONOMY'S close-tolerance drill-jig bushings and gages meet your exact specifications and high production standards. Write for bulletin and price list on all A.S.A. standard types and sizes, as well as new gages and gages salvaged by hard chromium plating.

Economy
TOOL & MACHINE CO.

1827 S. 68TH ST., MILWAUKEE 14, WIS.



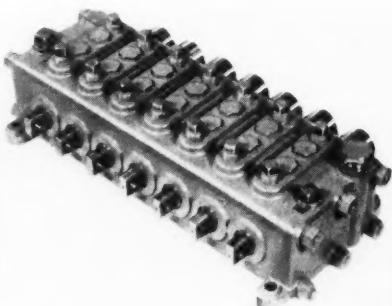
"Thor" No. 2 Class Pneumatic Tools and Attachments

types in 25 and 90-degree models. A complete range of direct drive or slip clutch attachments, with offset or lever throttle handles, is included in the line. The screw drivers are designed to handle up to No. 12 wood screws and $\frac{1}{4}$ -inch machine screws or nuts.

3/4-Inch Multiple Section Stack Valve Is Designed for "Series" Operation

A $\frac{3}{4}$ -inch multiple section stack valve developed by Sundstrand Machine Tool Co., Hydraulic Division, 2539 11th St., Rockford, Ill., is designed for "series" operation, permitting any number of devices to be actuated simultaneously under full or varying load, provided the total load does not exceed the relief valve setting. Identified as the S-25, the valve is recommended for use in road machinery, ditching and dredging equipment, exca-

Sundstrand S-25 $\frac{3}{4}$ -Inch Multiple Section Stack Valve

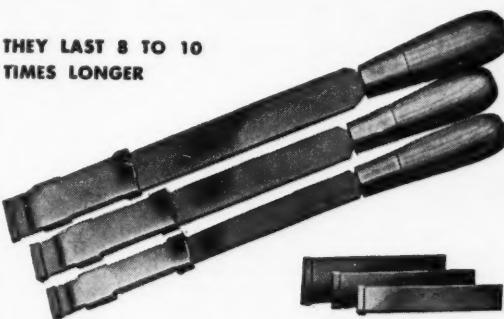


CARBOLOY TIPPED SCRAPER BLADES

Available in
three widths



THEY LAST 8 TO 10
TIMES LONGER



Especially good for hard alloy iron and extremely hard bronze castings. If you are using Anderson Hand Scrapers it is not necessary to buy complete new scrapers in order to use carboloy tipped blades. Simply remove high-speed blade and slip in the Anderson Carboloy Tipped Blade.

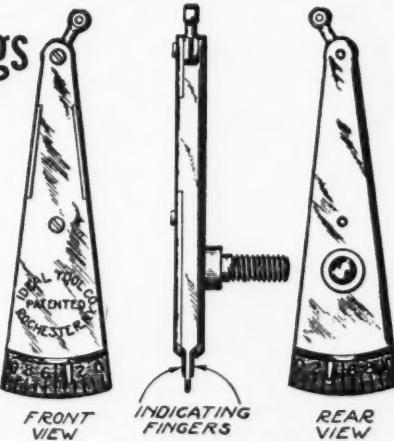
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ANDERSON BROS. MFG. CO., Rockford, Ill.

Balancing Ways, Roto Checkers, Hand and Power Scrapers,
Spotters, Hand and Power Hydraulic Straightening Presses.

DIAL Indicator Readings

From Front or Rear

- Accurate readings from the front or rear of an IDEAL INDICATOR is especially helpful when locating holes or where the indicator is fastened to a revolving spindle.
- IDEAL INDICATORS have been serving industry for 40 years with complete satisfaction. Prices shown include holder. Why pay more for superior service?



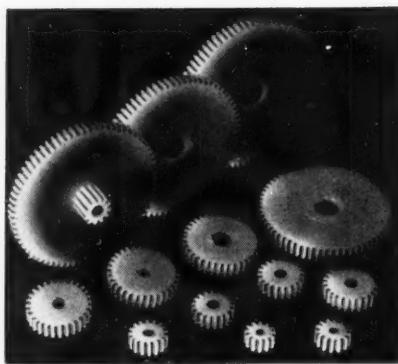
Price . . . \$6.00

Write for complete details.

IDEAL TOOL CO., 407 RIVER ST., ROCHESTER 12, N. Y.

vating machines, industrial tractors, and a wide variety of other types of mobile equipment.

A check valve is included in the body of each section to assure maximum safety. Positive starting and stopping under load is said to be assured. According to the manufacturer, loads cannot be dropped or shifted as their position is changed since positive cylinder movement is always maintained and no momentary reversal of the cylinder is possible as the stem is shifted. The valve incorporates pressure sealing by using "O" ring seals between sections. Since each section is an individual, standard unit, a valve assembly or "stack" may be designed to exact requirements with various inlet, four-way, three-way, and outlet sections.



Nylocatic Molded Nylon Gears

Molded Nylon Gears Provide Quiet Operation

Nylocatic Division, John A. English & Co., Morrisville, Pa., has announced a line of molded nylon gears which are said to provide for quiet operation and allow for maximum tolerances in center locations. Spur gears are available in 48

diametrical pitch and 14 1/2-degree pressure angle, ranging from 12 to 80 teeth. Unit-molded 48-pitch gear and pinion combinations for use in speed reducer applications are available on special order. According to the manufacturer, similar lines in 64, 32, and 24 diametrical pitch gears will be offered in the near future.



STOP the major cause of TAP BREAKAGE

increase tap life 5 to 10 times with TAP-CARTRIDGES

Drop TAP-CARTRIDGE into drilled hole; tap hole through cartridge; chips are imbedded in wax and forced out of hole. Tap is protected every thread of the way.

- very economical
- saves time and labor
- eliminates torn threads
- no cleaning-out operation required
- facilitates thread-cutting to bottom of hole
- available for tap sizes from No. 2 up and for any depth of drilled hole

For full details write to the . . .
TAP-CARTRIDGE CO.
1638 CENTRAL PARKWAY
CINCINNATI 10, OHIO



GANT

RIVETERS



• Pioneers in the riveting field. Head rivets from smallest to $\frac{3}{4}$ " diameter, either by noiseless spinning or vibrating hammer method.— Sizes to meet all needs.—Types include Vertical and Horizontal Multiple Spindles. Write for literature—and don't forget to send samples.

THE GRANT MFG. & MACHINE CO.
96 Silliman Ave.
Bridgeport 5, Conn.

FOR SMALL

JIG BORING

PUT SMALL JOBS ON THIS

LINLEY MACHINE

and save your larger machines for heavier work.

YOU'LL BE SURPRISED!

at the extremely low first cost and the vitally important jobs that this little precision machine can do. It will pay you to get our accuracy information on this machine which has $6'' \times 10''$ table movement and $7'' \times 17\frac{1}{2}''$ table size.

Write TODAY For
Bulletin J



**LINLEY BROS.
COMPANY**

663 State St. Ext.
Bridgeport 1, Conn.

Beloit HAND SPLITTING SHEARS HAND PUNCHES

No. 03



Give You Quick Economical Performance
HAND SPLITTING SHEARS

- BELOIT Splitting Shears (03 style illustrated above) are built with powerful leverage for easy, fast splitting sheets and cutting bars. Shear blades adjustable and quickly removable for sharpening.

Built in 03 and 04 sizes. Capacity, sheet metal—03 . . . $\frac{1}{8}$ "; 04 . . . $\frac{1}{4}$ "; rounds—03 . . . $\frac{1}{2}$ "; 04 . . . $\frac{3}{8}$ "; Length shear blades—03 . . . 5"; 04 . . . 5 $\frac{1}{2}$ ".

BELOIT HAND PUNCHES

Built in No. 5, 6, 7, 8 and 9 models with throat depth ranging from 6" to 24".

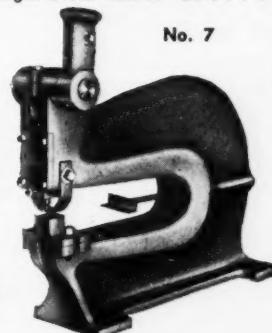
For low cost and efficient punching round and irregular shaped holes in sheet metal, BELOIT hand bench punches (shown at right) are ideal. Furnished with $\frac{1}{4}$ " round punch and die, adjustable stripper, back gauge and operating lever.

Write for Catalog No. 14-E

HENDLEY & WHITTEMORE CO. 110 Blackhawk Blvd.
BELOIT, WISCONSIN

Builders of Punches, Shears and Bending Rolls since 1900

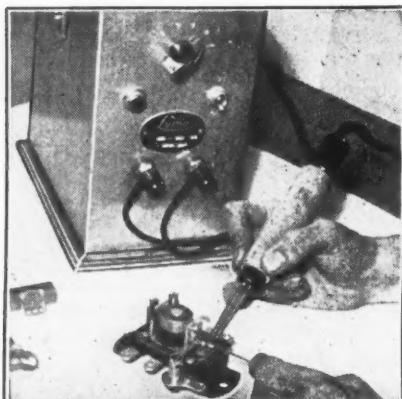
No. 7



Reamer Set Is Especially Designed for Reaming Dowel Pin Holes

Lavallee & Ide, Inc., Chicopee, Mass., has introduced a reamer set designed especially for the reaming of dowel pin holes. The set consists of 14 reamers in pairs from $\frac{1}{8}$ inch by sixteenths. Each pair includes one reamer 0.0020 inch undersize and one reamer 0.0005 inch undersize except the $\frac{1}{8}$ -inch reamers which are 0.0020 and 0.0003 inch respectively. Tolerances are plus 0.000 inch and minus 0.0002 inch.

Sizes $\frac{1}{8}$ through $\frac{1}{8}$ inch are ground



FOR FASTER, SAFER SOLDERING

The Luma resistance method of soldering is the accepted way for small shops requiring single operation to large plants with many types of operations. Write for complete information about this remarkable tool.

LUMA ELECTRIC EQUIPMENT CO.
P. O. Box 132-M.S. Toledo 1, Ohio



Lavallee & Ide Dowel Pin Reamer Set

from the solid and made with external centers; larger sizes have polished flutes and internal centers. Each reamer has a back taper of 0.0005 inch per $1\frac{1}{2}$ inches with no relief on the flutes. Each shank is stamped with the exact size.

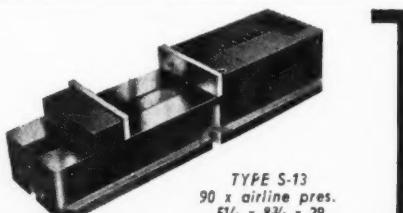
Indicator Snap Gage Checks Shafts

An indicator snap gage for checking splined shafts has been announced by Vinco Corp., 9111 Schaefer Highway, Detroit 28, Mich. The gage has a straight-sided rack tooth or a cylindrical section representing a measuring wire on the bottom and top jaws. The top jaw is movable and actuates the dial cushion movement indicator which is calibrated in increments of 0.0001 inch. A thumb-operated

AIRLOX PNEUMATIC VISSES

Five senior models. Many special-purpose construction. 50 to 200 times airline pressure. Write for data sheets • Wedge-&-lever action utilizes total cylinder drive. Pat'd. Exceptional rigidity particularly suited to work-holding on CARBIDE MILLING, and almost all milling operations.

production devices, inc.



TYPE S-13
90 x airline pres.
 $5\frac{1}{4} \times 8\frac{3}{4} \times 29$
Max. jaw opening 12"

Whitehall, New York

Shuregrip BORING BARS



DOUBLE END 30° & 90°

Number	1-A	2-A	3-A	4-A	5-A	6-A	7-A
Bar. Dia. In.	3/8	1/2	5/8	3/4	1	1 1/4	1 1/2
Length In.	7	8	9	11	13	18	23
Cutter In.	1/8 Rd.	1/4 Rd.	5/16 Sq.	1/2 Sq.	5/8 Sq.	1 1/8 Sq.	1 1/4 Sq.
Price Each	1.95	2.10	2.95	3.25	4.55	10.75	20.80

SINGLE END 30° & 90°

When Ordering—State Angle Required	Number	1-B	2-B	3-B	4-B	5-B	6-B
Bar. Dia. In.	3/8	1/2	5/8	3/4	5/8	1 1/8	1 1/4
Length In.	3	4	5	7	8	10	12
Cutter In.	1/8 Rd.	1/4 Rd.	5/16 Sq.	1/2 Sq.	5/8 Sq.	1 1/8 Sq.	1 1/4 Sq.
Price Each	1.25	1.35	2.20	2.50	2.60	2.80	3.00

Adjustable Boring Bar holders available take bars from $\frac{3}{8}$ " up to $1\frac{1}{2}$ " diameter. T-Blocks made to fit any lathe. Price list on request.

WRITE FOR PRICE
ON LARGER BARS

BREAK OFF ON SCORE, AS REQUIRED

1-6" Length— $\frac{1}{4}$ Dia. H.S.S. Tool Bit Stock—Hardened—each	.95¢
1-6" Length— $\frac{3}{8}$ Dia. H.S.S. Tool Bit Stock—Hardened—each	\$1.05
Round Tool Bits Furnished in 1-A, 2-A, 1-B and 2-B—All Others	
Square. 1 Hexagon Wrench Furnished with Each Bar.	
Price of Square H.S.S. Cutter Bits. $\frac{1}{8} \times 1$ $\frac{1}{4} \times 1 \frac{1}{4}$ $\frac{5}{16} \times 1 \frac{1}{2}$ $\frac{3}{8} \times 1 \frac{1}{2}$.20 .30 .40 .65

J. E. FREYMAN & SONS, INC.

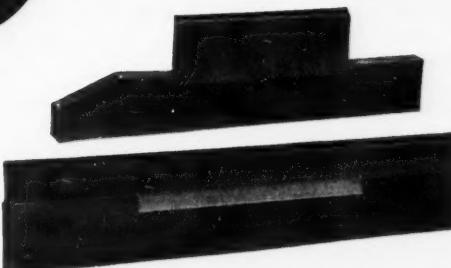
3627 KESWICK RD.

BALTIMORE 11, MD.



Standard thrufeed and in-feed work support blades available from stock. Prices on special blades quoted on receipt of prints. We retip and regrind. Let us salvage your worn blades.

CARBIDE TIPPED
Work Support Blades
for CENTERLESS GRINDERS



WILLEY'S CARBIDE TOOL CO.

SOLE MAKERS OF WILLEY'S METAL

1342 W. Vernor Highway

Detroit 1, Michigan

KIPP
Air Grinders

- FASTER SPEEDS
- BETTER RESULTS
- LOW PRICES

MODEL JA
50,000 R.P.M.
Weight 12 ounces; length
6 3/4 inches; chuck size
1/8 inch. Wheel guard re-
moved for better illustration.

\$42
IN U.S.A.

THEY GRIND—NOT JUST RUB!

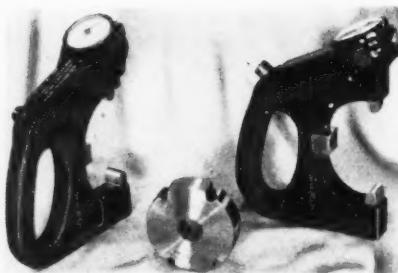
The RPM's stay up while grinding . . . not only when the grinder runs idle.

It is an established fact that surface speeds must stay up to approximately a mile a minute if you want to grind . . . not just rub. Every mechanic knows this, but an inexperienced buyer may order tools that maintain proper grinding speeds only when running idle. The speed of Kipp air grinders drops but slightly when put to work. That means better work . . . longer wheel life.

MADISON-KIPP CORP.

208 Waubesa St., Madison, Wis., U.S.A.

Write for KIPP Air Tool Catalog at 3006



Vinco Indicator Snap Gages

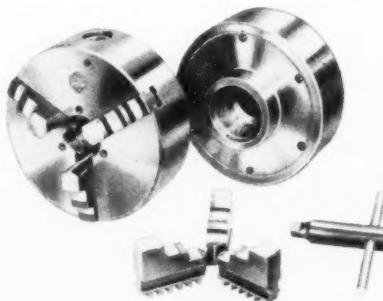
button is used to lift the upper jaw, thus permitting the indicator snap gage to be placed over the shaft to be inspected.

The gage is designed to check only the actual (dimensional) tooth thickness at or near the pitch diameter. Variations in tooth thickness are read on the dial indicator. The gage is set to set masters and is available in sizes from 0 up to and including 8 inches.

Universal Chuck Requires No Adapter

Westcott Chuck Co., Oneida, N. Y., has announced the addition of a 6-inch 3-jaw universal chuck to its line of lathe chucks. The chuck features a threaded body back for direct mounting on lathes, milling machines, grinders, and other machine tools with 2 1/4-inch 8-thread spindles. According to the manufacturer, no adapter is required in installing the chuck which is mounted close to the spindle bearing, thus minimizing chatter that may be caused by excessive overhang.

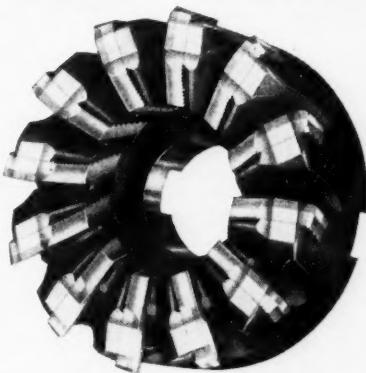
Westcott 6-inch 3-jaw Universal Chuck



APEX INSERTED-BLADE METAL-CUTTING TOOLS

Here's a "BIG BULL" Cutter
for your
HEAVY DUTY JOBS

APEX offers many cutters for many jobs. Here's one that takes a big chip fast. It can be had with H.S.S., Stellite, Cobalt or Carbide tipped blades. These blades adjust automatically in two directions. No damage to carbide tips. Diameters from 8" to 24". We also make cutters for lighter work. Write for catalog.



APEX TOOL & CUTTER CO., Inc., Shelton 15, Conn.

PERFECTION LIVE CENTER



PATENT No. 2549613

• The new Perfection Free Center carries the unusual guarantee for one year (or 3000 hours of continuous operation). This is possible because of simplicity of design with only six parts including the shank plug.

• These centers can be furnished to meet your requirements to any capacity up to the limit of the roller bearings. Write today for complete information.

GUARANTEED 3000
HOURS CONTINUOUS
SERVICE

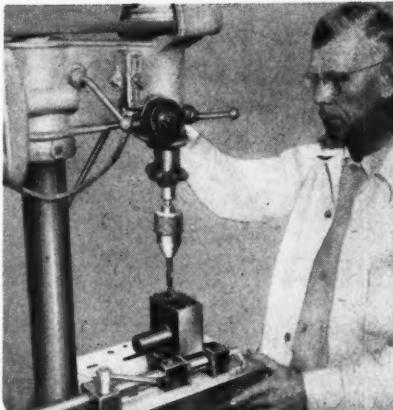
- ECCENTRICITY TOLERANCE LESS THAN .0001"
- SIMPLE DESIGN
- ABSOLUTE CONCENTRICITY AND PERFECT ALIGNMENT FOR THE TWO BEARINGS

"The Center that
STAYS on CENTER!"

MECHANICAL DEVELOPMENT CORP. 162B BEAVER AVE.
PITTSBURGH 33, PA.

Safety Vise Is Designed to Extend Usefulness of Drill Presses and Band Saws

Designed to extend the usefulness of drill presses and band saws, a versatile safety vise now being manufactured by Float-Lock Corp., Subsidiary of American Machine & Foundry Co., 511 Fifth Ave., New York 17, N. Y., is described as a "full-floating" tool which can be used in a wide variety of setups in toolrooms and on production and assembly lines. Easy to mount, the drill press model can be quickly locked in practically any posi-



AMF Float-Lock Safety Vise being used on a drill press

RECLINABLE POWER PRESSES



Ideal for general stamping work . . . 4 to 100 tons capacity. Can recline to 40° with perfect safety.

Our catalog contains a wide variety of press types and sizes. Write for it today.

* 48th year serving worldwide industry with Patent Percussion, Open Back, Double Crank, Punch, Horn, and Toggle and Straight Side Presses, Dial and Roll Feeds.

ZEH & HAHNEMANN CO.
190 VANDERPOOL ST., NEWARK 5, N. J.

tion on the table without the use of auxiliary clamping devices. Regular, end, or angle drilling can be easily performed with the vise, which can be used as a jig when duplicate pieces are required or repeat assembly operations must be performed. The vise can be turned over on three sides for maximum flexibility and can be swung completely out of the way when not in use. The drill press model is said to have a maximum capacity of 8 inches.

The band saw model, which has a 10-inch maximum capacity, permits the operator to perform all types of sawing operations without touching the material. The vise can be used for cutting vertical pieces, compound and simple angles, irregular shaped, hard-to-hold pieces, as well as for automatic chain feed operation.

MILWAUKEE PRECISION EQUIPMENT

Surface Plates, Angles, Parallels, and Straight Edges are all backed by over twenty years of practical experience. You pay no more for this added assurance of accuracy and durability.

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FOR MACHINE TOOLS

Standardized set-up appliances

Why Force Your Men to waste time on machine tool set-ups when CAD Standardized Appliances will convert this non-productive time into productive labor? Why Ruin Machine Table Slots with ordinary bolts when CAD Bolts are designed to fit T Slots? The CAD Bolt is a standard machine table bolt, made of steel with full smooth threads, ready for use when you receive it.

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STANDARD SHOP EQUIPMENT CO.
SET-UP APPLIANCES for MACHINE TOOLS
R177 Tinicum Ave., Philadelphia 42, Pa.

**for greater RIGIDITY
more ACCURATE cuts**

use
CRITERION
BORING HEADS

CRITERION
machine
WORKS

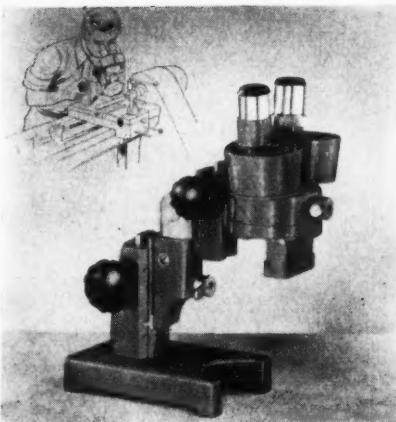


A full line of adjustable boring heads and bars now available. Heads 1½" to 7" dia. Carbide or high speed bars $\frac{3}{8}$ " to $1\frac{1}{4}$ " dia. Lead screws ground AFTER HARDENING. Ample bearing surface, heat treated parts, interchangeable shanks. Criterion tools are the criterion. Write for free catalog and costs.

9312 SANTA MONICA BLVD. • BEVERLY HILLS, CALIF.

Industrial Stereomicroscope Can Be Built into Machine, Assembly and Inspection Setups

An industrial stereomicroscope which can be built into machine, assembly, and inspection setups to speed processing, reduce rejects, and minimize operator fatigue has been announced by Bausch & Lomb Optical Co., 635 St. Paul St., Rochester, N. Y. The instrument is said to provide for comfortable observation of an enlarged image with a wide field of view, long working distance, and three-dimen-



Bausch & Lomb Industrial Stereomicroscope



CAMS

Specialists in Cams
Single or in Production
ROWBOTTOM EQUIPMENT

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L. G. SCHLECHT & SON, INC.
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Straight or Dished

ALSO SCREW CLAMPS, MACHINE VISES, FIXTURE UNITS, MAGNETIC BLOCKS AND ROTARY TABLES.

Write for Catalog and Prices on Complete Reid Line

REID TOOL SUPPLY CO.
709 BAKER ST. MUSKEGON HTS., MICH.

sional easily-interpreted qualities. When built into a setup, it allows for continuous observation of the operation so that manufacturing and inspection standards can be adhered to, especially in such processes as fine machining, assembling of minute parts, and making tiny welds in electronic wiring.

The stereomicroscope embodies vertical eyepiece tubes with adjustments for interpupillary distance and balancing acuity of the observer's eyes; binocular dustproof prism bodies; and illuminator socket. With the instrument, a 1.0X objective in combination with a 10X eyepiece will provide 10X magnification with a 0.79-inch field and a 3.77-inch working distance. Magnification up to 150X is possible through other combinations. The instrument is available with a large range of wide field objectives and wide field eyepieces.

FLYNN

FOR OVER 30 YEARS
THE PREFERRED
OFFSET BORING HEAD

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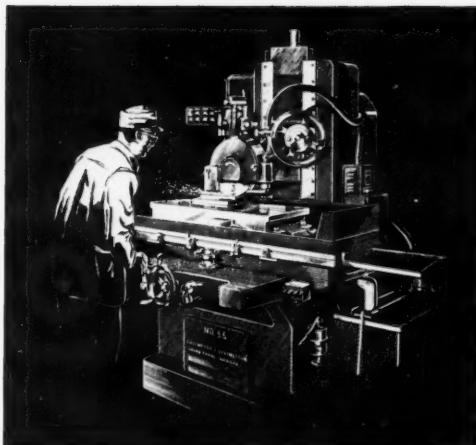
FLYNN MANUFACTURING CO.
101 FLOWERDALE AVE. • DETROIT 20, MICH.



**ABSOLUTE
TOLERANCE
CONTROL**

When job specifications leave no leeway, when extreme tolerances must be rigidly maintained . . . that's when the built-in precision of Grand Rapids Grinders proves most valuable.

Defense commitments are delaying rapid fulfillment of your orders . . . but as always we're doing our best to serve you.



**GALLMEYER
& LIVINGSTON**

GRAND RAPIDS GRINDERS

...the very best

GALLMEYER & LIVINGSTON CO., 308 Straight Ave., Grand Rapids, Mich.
Manufacturers of
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*Leaders over 50 years
Established 1899*

**TOOL
CRIBS and
PARTITIONS**

Standard Sections Woven Wire Mesh Panels and
Doors to enclose Tool Cribs, Stock rooms and other
enclosures.

IMMEDIATE DELIVERY Write for Catalog

Acme Wire & Iron Works
3527 E. Canfield — Detroit 7, Mich.

Turret Lathe Is Designed for Making Instrument Parts

A bench turret lathe designed to handle very small parts is now being marketed by Louis Levin & Son, Inc., 786 E. Pico Blvd., Los Angeles 21, Calif. The lathe has two collet capacities of $\frac{1}{8}$ and $\frac{1}{16}$ inch and is equipped with a lever-operated collet closer, a double-tool cross slide with a swivel-compound slide, and a self-indexing 6-position turret. The bed of the lathe is 18 inches in length. The turret head has holes which are $\frac{1}{2}$ inch in diameter, and the turret slide is made



Levin Bench Turret Lathe

of hardened steel, providing for maximum accuracy and long wear.

MARVIN ROTARY TABLE
For bench mill, shaper, or drill press.
Height 2 $\frac{1}{2}$ ", Diameter 6 $\frac{1}{4}$ ".
Shipping weight 18 pounds.

Write for complete information
and
the name of your nearest distributor.

MARVIN Machine Products Inc.

414 FORD BUILDING • DETROIT 26, MICHIGAN

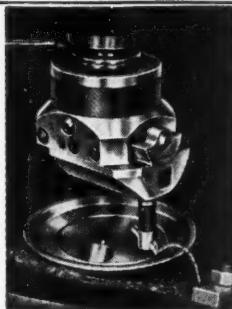
Electrical Comparator Gage

The DoAll Co., 254 N. Laurel Ave., Des Plaines, Ill., has announced an electrical comparator gage available



DoAll Electrical Comparator Gage

in various models, each of which provides four gaging ranges. Simply by flicking a switch, any one of the four ranges can be selected so that parts can be checked with the range best suited to their tol-



**ONE
Tool
ONE
Set Up**

...for boring,
facing, turning,
recessing,
undercutting.

MASTERHEAD

**THE BORING HEAD THAT
THINKS FOR ITSELF**

Featuring: automatic feeds, end release and return; adjustable stop; adaptable to all standard machines; highest precision; ideal for jig borers; seven models for work up to 24" diameter.

Send for Illustrated Literature

KARL A. NEISE

381 4th Ave., Dept. MMS, New York 16, N.Y.

"MITI-MITE" No. 120

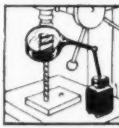
**THE NEW, AMAZING
COMBINATION MAGNETIC
BASE HOLDER FOR
MAGNIFIER AND DIAL
INDICATORS—**

ATTACHES INSTANTLY
TO CURVED OR FLAT SURFACES



Magnifier Available Separately
For those who already have MITI-MITE No. 100, order
No. 125 \$4.50

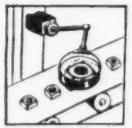
NO MORE HAPHAZARD, CUMBERSOME CLAMPING



For precision drilling.



For quick reading of
Vernier Scale, etc.



Ideal for inspection of parts
along production lines.

ENCO MANUFACTURING COMPANY, Dept. 1112
4524 W. Fullerton Ave.,
CHICAGO 39, ILL.
Also Manufacturers of the Well Known Lathe Turrets

"OLIVER" Wet Grinder & Polisher

**for finishing
outside and
inside edges
at low cost**



This new machine will cut your costs on grinding and polishing inside and outside edges of plastic and non-ferrous castings. A whirling jet of water is sprayed on belt. Has belt 1 1/2" wide and hard-chrome plated guide form.

Write for Bulletin 190-W

OLIVER MACHINERY COMPANY
GRAND RAPIDS 2, MICH.



COMPLETE WITH ALL
ACCESSORIES AS SHOWN \$12.00

OTHER "MITI-MITE" UNITS

No. 100	Magnetic Base Holder for smaller test indicators.	\$7.50
No. 150	Duplex Magnetic Base Holder for all dial indicators up to 3" dia.	\$15.50
No. 200	Magnetic Base Handi-Lite complete with 25 and 40 watt bulbs.	\$8.50
No. 300	Combination of No. 100 and No. 200.	\$15.50

SEND FOR BULLETIN No. 604

Order from your mill supply dealer or send order
with name of your mill supply dealer

erances. The comparator utilizes the electromagnetic principle of magnifying the movement of the spindle tip, and there are no frictional moving parts in the gage head.

Spindle pressure is adjustable from 4 to 40 oz., and is set by means of a knob and associated calibrated dial. A spindle lifter is supplied to facilitate checking of very small or delicate parts. Spindle tips are made of long-wearing boron carbide. The gaging head swivels 360 degrees in both horizontal and vertical planes and can be removed for use in special gaging setups or in remote indication setups. The comparator has a capacity for gaging

heights up to 6½ inches and depths up to 4 inches. A special long column is available which provides an effective checking height of 20 inches.

Horn Press Features Adjustable Bed

Perkins Machine Co., Warren, Mass., has announced a horn press, designed as the Model No. 556, which features an adjustable bed and a capacity of 45 tons. The press has a 2½-inch stroke with maximum adjustment up to 7 inches and a 38-inch diameter flywheel. The bed area of the press measures 22½ x 26 inches, while the distance from the

The advertisement features a central image of a "VERSATILE Heavy Duty Gage Blocks" assembly, which includes a long slide, a dial indicator, and a gaging head. Below this main image are several smaller photographs of different gage block sets and fixtures, such as "CARBLOX CARBIDE" and "STANDARD STEEL BLOCKS". To the right of the main image is a bulleted list of features:

- Assembled in a few seconds
- Extra large gaging surface
- Sturdy, rigid build ups
- Low in cost

Details upon request.

At the bottom left is the company logo: "Webber GAGE COMPANY 12899 TRISKETT RD. CLEVELAND 11, OHIO". At the bottom right are two more sets of gage blocks labeled "ANGLE BLOCKS" and "H.D. BLOCKS and FIXTURES".

LARGEST EXCLUSIVE MANUFACTURER OF PRECISION GAGE BLOCKS



Perkins Model No.
556 Horn Press

center of the slide to the frame is 12½ inches. Distance between gibs measures 11½ inches.

The press is available with either a solid cast, adjustable, or swinging bed. All working parts in the Model No. 556 are interchangeable with the working parts in the Model No. 550 B press.

WHO*

No question about it. It's your best source of supply for precision "milled-from-the-bar" screw machine products.

CAP SCREWS	COUPLING BOLTS
SET SCREWS	MILLED STUDS

* Wm. H. Ottmiller Company York, Penna.

Tomco

HAND WHEELS
HAND KNOBS
MACHINE HANDLES
HANDLES
BALL HANDLES
SPECIALTIES

Write for literature

Tomco
PRODUCTS CO.

1425 DOUGLAS AVE.
RACINE • WISCONSIN

Blank or Machined - from stock

HYDRAULIC INDEX TABLE

This table is driven by a fluid motor and is locked in the indexed position by a hydraulically operated shot bolt. The table rides on hardened and ground wear strips, is automatically lubricated, and the table spindle is mounted in heavy-duty tapered roller bearings.

Can be furnished in sizes 30", 36", 42" and 48".



Lee Engineering Company, Inc.
4700 BURLINGAME • DETROIT 4, MICHIGAN

Hard-Steel Drill Comprises Solid Carbide Slug Brazed to Alloy Steel Shank

The Nelco Tool Co., Inc., Manchester, Conn., has announced a carbide-tipped hard-steel drill which comprises a solid carbide slug sandwich brazed to an alloy steel shank. The carbide slug is brazed to the shank in a V-notch to assure unusual torque strength when drilling heat-treated steel. When used on heat-treated steel, the drill, it is claimed, in no way anneals the material. A pulverized chip is formed which the drill readily expels from the hole.



Nelco Carbide-Tipped Hard-Steel Drill

The drill is available in sizes ranging from $\frac{1}{8}$ to $\frac{1}{2}$ inch in increments of $\frac{1}{32}$ inch. Other sizes are available on special order to meet user's specifications.

Adjustable Drill Jig Holes in Round and Hex Stock

An adjustable drill jig designed for drilling holes through round and hex stock ranging from $\frac{1}{4}$ to 2 inches in diameter and cap screws from $\frac{1}{4}$ to $1\frac{1}{4}$ inches in diameter has been announced by Mathewson Machine Works, Inc., 2 Hancock St., North Quincy 71, Mass.

The drill jig is said to be ideal for drilling holes in cotter pins, set screws, drive pins for bayonet joints, oil holes in tubular sections, and wiring holes in cap screws. The jig incorporates a hardened V-block having two 60-degree vees and an adjustable stop having a maximum capacity of 9 inches for locating work longitudinally. The adjustable stop may be used on either side of the jig. Centered above the V-block is an adjustable bushing carrier which holds a slip bushing and also clamps the work securely to the block. Three bushing carriers are provided to accommodate slip bushings of various standard outside diameters.

Whenever your production process demands a blow, ELECTROPUNCH may be just the machine you need. This all-electric impact hammer delivers a lightning-fast, controllable blow. Produces up to 10,000 pieces per hr. with auto-

matic switching—as high as 5,000 pieces per hr. with hand or foot switching. Ideal for steel stamping, swaging, etc.

ELECTROPUNCH is portable, uses only one sq. ft. of bench space, plugs into any 115 V., A. C. outlet. Lightest model (illustrated) sells for only \$90.75.

Write for descriptive folder.

BLACK & WEBSTER, INC.

Dept. 11, 445 Watertown St., Newton 58, Mass.

Phone: Frank Webster—Bigelow 4-6370

WIDELY USED TO

STAKE

MARK

SWAGE

CUT OFF

RIVET

CRIMP

BEND

PUNCH

DIMPLE

BREMIL
The IMPROVED Compound Lever Shears

ALL ALLOY
FULLY
GUARANTEED

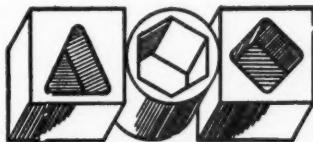


Two Sizes

PORTRABLE

No. 1 cuts up to No. 11 gauge strip or sheet.
No. 2 cuts up to $\frac{1}{4}$ " steel plate.

BREMIL MFG. CO.
1400 Pittsburgh Ave., Erie, Pa.

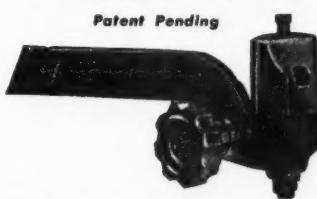


DRILL THESE HOLES
BY A QUICK, EASY, INEXPENSIVE METHOD
Your business letterhead will bring literature.

WATTS BROS. TOOL WORKS
Wilmerding, Pa.

**Monarch Precision
SHAFLANE
Radius Tools**

Patent Pending



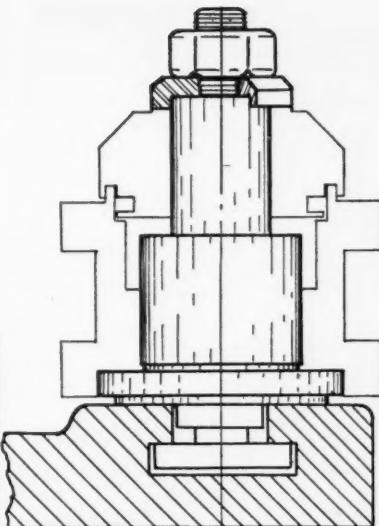
Five Models for

**LATHES, SHAPERS, PLANERS,
AND BORING MILLS.**

RANGE $\frac{1}{2}$ " TO 3" RADIUS (MODELS ALSO
AVAILABLE FOR CONVEX CUTTING, AND
CONCAVE RADII TO 6" ON PLANERS, ETC.)

C. B. TEETER

Tool Room Specialties
4470 Oakenwald Ave., Chicago 15, Ill.
Phone Drexel 3-3571



**HEAVY-DUTY, SELF-INDEXING
TOOL POST TURRETS**

**Note: Exclusive Super-Solid
Center Post Construction**

Tool up with Lynn turrets. They increase variety and output. Save time. Built for all sizes and makes of engine and turret lathes and screw machines. Note: The extra large bearing on the post assures absolute rigidity, increases precision and makes for longer life. They are accurate, without installing more lathes.

**“F” SERIES TURRETS
BT-1 — BT-2**

For Atlas and Logan lathes, either pilot wheel or lever type. **Special Features:** Automatic indexing—double gibbs for wear adjustment—heavy duty design square turret ways—lifetime precision tool indexing—turret head lock. Greatest possible precision assured.

Write or Phone Atlantic 7267

LYNN MANUFACTURING CO.
1121 So. 71st, Minneapolis, Minn.

**Keep a Close Check
On Accuracy With
SUNDSTRAND
Bench Centers**



Simplify assembly, lower spoilage and get better production from this modern Sundstrand Bench Center. You'll check work between centers easier, faster and within limits of .0001" on this improved Sundstrand Bench Center.

"One-hand control" over all movable elements leaves the operator's other hand free to control rotation of the part being checked. Either headstock or tailstock can be unclamped, positioned and locked in place with a single hand operating the top lever. Investigate this bench center today.

Complete Range as Follows:

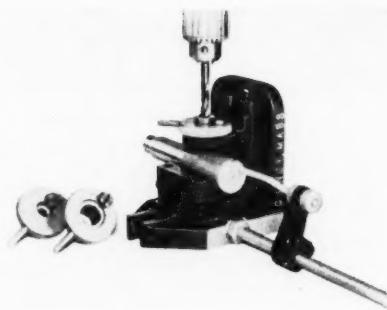
6" x 18"	12" x 48"	24" x 48"
6" x 36"	12" x 60"	24" x 60"
12" x 36"	12" x 72"	24" x 72"

FREE Additional Data

covering complete specifications and additional features is contained in this bulletin. Write for your copy. Ask for data sheet 526.



SUNDSTRAND MACHINE TOOL CO.
2539 Eleventh Street, Rockford, Ill., U.S.A.



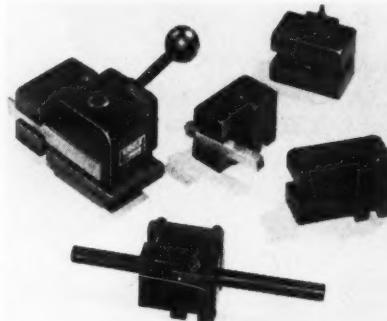
Mathewson Adjustable Drill Jig

ters. The Mathewson Adjustable Drill Jig measures 5 1/4 inches high, 4 1/4 inches wide, and 7 inches long.

**Toolholder and Boring Adapters
Fit All Standard Lathes**

A toolholder and component boring adapters which are designed to fit all standard engine and turret lathes has been introduced by The Kirkelie Co., 8717 Darby St., Northridge, Calif. According to the manufacturer, the unit permits tool bits to be adjusted vertically without moving the bits in their holders, and no shims are needed for height adjustment of tool bits. The tool bits can be removed with the holder adapters for resharpening without changing the setup. Tool bars are removed vertically, thus eliminating the necessity of moving the carriage back. The unit is said to maintain close tolerances, repeating within 0.0003 inch.

Kirkelie Toolholder and Boring Adapters



**IMMEDIATE DELIVERY
MACHINE TOOLING**

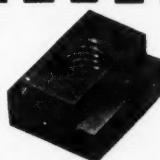
FOR ALL STANDARD MACHINES

Our Ten Million Dollar Tool
Crib serves Big and Little
plants all over the nation.
Everything Guaranteed!

We Buy Mfg. Plants
Machine Shops,
Big Tooling
Inventories

U. S. INDUSTRIAL TOOLS

416 So. Central Ave., Los Angeles 13, Calif.



T-NUTS

—

STUD SETS

—

STRAP CLAMPS

—

SURE GRIP STEP BLOCKS

TIETZMANN TOOL CORP.

ENGLEWOOD, OHIO

SOLD THRU LEADING SUPPLY HOUSES



GROBET CHATTERLESS COUNTERSINKS

Six staggered cutting edges give shearing
cut that eliminates all chatter.

Send for catalog BC1.

GROBET FILE CO. OF AMERICA, INC.
421 Canal Street N. Y. 13, N. Y.

New York • Chicago • Montreal

Lower

TOOLING COSTS

WITH

**SLOTTED
SLEEVES**



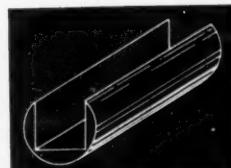
No longer is it necessary to spend hours in filing square or rectangular holes when installing tool bits in boring bars, tool holders and cutter heads. With "Novi" Slotted Sleeves, you just ream a hole to fit the sleeve. Then drill and tap two more holes — one to hold the tool in place and the other for adjustment. All done in a matter of minutes! Made in sizes for tool bits 3/16" to 1" wide and 1" to 4" long. Write for literature.

Some Territories

**Still Open
to Jobbers**

Novi

**An Easy Method
of Installing Tool
Bits in Boring Bars,
Tool Holders
and Cutter Heads**

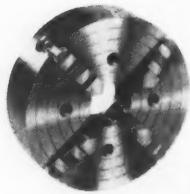


Novi Tool & Machine Co.

43043 Grand River

Novi, Mich.

SLOTTED SLEEVES



Buck Tool 4-Jaw
Independent Chuck

the chuck is said to have unusual gripping power which is provided by extra large

Independent Chuck

A 4-jaw independent chuck which is designed to eliminate excessive overhang has been announced by Buck Tool Co., 514 Schippers Lane, Kalamazoo 62, Mich. Intended for lathes from 9 to 16 inches,

diameter operating screws having 9 pitch Acme threads that allow for fine adjustments and quick, easy centering of the workpieces.

Ram-Type Turret Lathe Is Designed for Heavy-Duty High-Speed Production

The Ward No. 2C Ram-Type Turret Lathe which is designed for heavy-duty high-speed production of components from bars up to 1½ inches in diameter or from castings, forgings, or billets up to 7 inches in diameter is now being offered by British Industries Corp., 164 Duane St., New York 13, N.Y. The lathe incorporates a flanged-nose type spindle which is rigidly supported in combined radial and axial-thrust precision ball bearings and heavy-duty roller bearings. Twelve spindle speeds ranging from 48 to 2,041 r.p.m. are available.

The lathe features an automatically cam-operated spindle brake which is said to instantaneously stop the spindle at any speed. Longitudinal power feeds are available to both the turret slide and the cross slide saddle. The turret slide has six rates of feed ranging from 0.0025 to 0.0167 inch per revolution. One-inch diameter holes in the hexagon turret enable the use of standard American screw machine and turret lathe tools. Special toolholders with overhead pilot bushings are supplied with the machine.

PRECISION
FOR Carbide Finishing

ELGIN DIAMOND
IN DYMOC

...Designed for Carbides!

Where precision really counts, finishers specify ELGIN Diamond because they can be sure of:

- consistent accuracy—uniform cutting action
- flawless finishes every time, in less time

Actual field tests prove this new diamond abrasive up to 20% faster for finishing carbides.

Send for the DYMOC bulletin today!

ABRASIVES DIVISION, Dept. E
ELGIN NATIONAL WATCH COMPANY
ELGIN, ILLINOIS

ATLANTIC GEARS



SPUR - SPIRAL - WORM
BEVEL GEARS GENERATED
WITH PRECISION ON
MODERN EQUIPMENT

Send Samples or
Blueprints for Quotation

Call CANal 6-1440

ATLANTIC GEAR WORKS, INC.
198-A LAFAYETTE ST. • NEW YORK 12, N.Y.

SAVE

TIME and MONEY
with

GARBERDING

STOP-PINS
AVAILABLE IN 5 SIZES



FINGER STOPS
IN 3 SIZES



TWENTIETH CENTURY
MANUFACTURING CO.

Route 176 and Bradley Road, Libertyville, Illinois

STOP-PINS are complete self contained units that hold securely in stripper plate. All sizes have 1/32" wall permitting insertion close to die or punch. No threads inside STOPS for springs to catch on. Write for literature and prices.

GARBERDING FINGER STOPS made in uniform width to fit any standard width slot. Just grind ends to fit.

Write for literature

SAVE TIME AND MONEY

WITH THIS
CUTTER GRINDING FIXTURE

RUGGED! RIGID! ACCURATE! LOW-COST
UNIVERSAL CUTTER GRINDING FIXTURE

fits any universal tool or surface grinder. Here's the answer to your cutter and tool grinding problems.

PRECISION BALL END MILL grinding is done easily with this flexible and compact instrument, it grinds up to 2 1/4" dia., sets at any angle or radius with any cutting clearance on square, conical or ball nose shaped end mills.

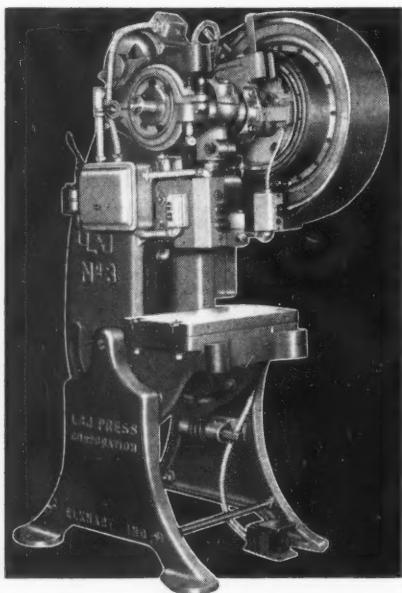
WRITE TODAY FOR DESCRIPTIVE FOLDER No. 602

ROCHELEAU TOOL AND DIE CO.

650B NORTH MAIN STREET • LEOMINSTER, MASSACHUSETTS



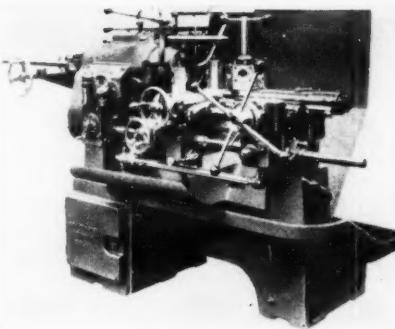
L & J PRESSES



for Higher Productivity

It is the rigidity and accuracy of L & J Presses that gives them their outstanding reputation. Repeat orders from users is convincing proof of their performance. Put them to work and you'll see output climb. Production will meet exacting specifications—dies will last longer—and only a minimum of routine maintenance will be needed. L & J Presses are made in 12 O.B.I. models—back geared and plain flywheel types—and 8 sizes from 6 to 80 ton capacities. Air clutches optional.

Write for literature



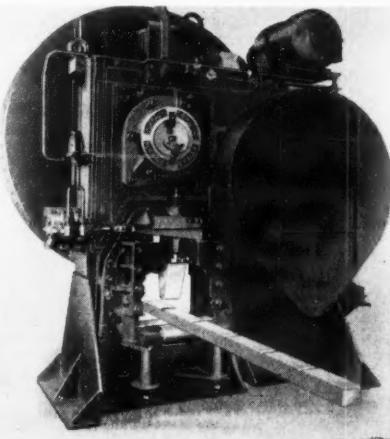
Ward No. 2C Ram-Type Turret Lathe

for use in conjunction with the overhead pilot bar in the performance of turning and boring operations.

Machine Is Capable of Breaking and Shearing Nicked Billets

Buffalo Forge Co., 388 Broadway, Buffalo, N. Y., has announced a machine which is said to be capable of both breaking and shearing hot or cold nicked billets with regular shear knives. An automatic air-operated hold-down clamps the billets during breaking operations. The machine is furnished with an air-operated jaw clutch designed to withstand

Buffalo Combination Billet-Breaker and Shear



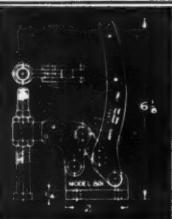
KELLY

Fast Grip
Toggle

CLAMPS

For mounting horizontally or vertically. Toggle bar set at any angle. Complete with spindle.

Write for folder.



R. J. KELLY MFG. CO.
P.O. Box 61 (Broadway Sta.), Newport, R.I.

MASTERCRAFT Rotary Tables



Write for circulars describing this and other models.

F & M SALES, Inc. 1054 Cahuenga Blvd.
Hollywood 38, Calif.

Model 700-R
is an improved combination slide and rotary table for use on either the miller table, drill press or lathe face-plate. Table 7 1/2" dia. Rotates through 360°. Height 4 3/4" overall.



economical
metal cutting with

VICTOR "Moly"® HIGH SPEED POWER BLADES

Whatever your metal cutting problem, VICTOR "Moly"® High Speed Power Blades will cut your initial blade cost 15% and give you more efficient cutting.

Quality makes VICTOR Blades industry's preference—top-quality, carefully heat-treated steel, fabricated on specially designed equipment. Send for the free VICTOR Metal Cutting Booklet which tells you how to pick 'em—Gold "Moly"® High Speed or Silver Unbreakable High Speed.

ECONOMICAL SERVICE from your VICTOR DISTRIBUTOR

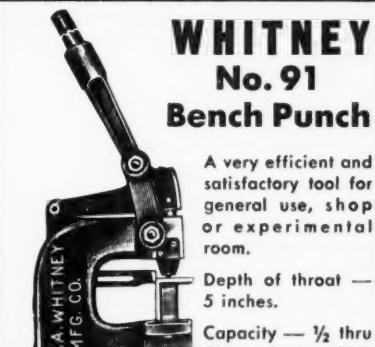
VICTOR "Moly"® High Speed Power Blades are always sold through the recognized Industrial Distributor. You know and have confidence in him, get delivery from stock where and when you want it.

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VICTOR

SAW WORKS, INC. • MIDDLETOWN, N.Y., U.S.A.

Makers of Hand and Power Hack Saw Blades,
Frames and Metal Cutting Band Saw Blades



WHITNEY No. 91 Bench Punch

A very efficient and satisfactory tool for general use, shop or experimental room.

Depth of throat — 5 inches.

Capacity — 1/2 thru 1/4 or 2 thru 1/8".

Notches angles 1 1/2 x 1 1/2 x 1/8".

Punches supplied in rounds, squares, ovals, rectangles or specials. Especially adaptable for experimental work. Also made in 10", 18" and 24" depth of throat.

Write for catalogue.

W. A. Whitney Mfg. Co.
640 Race St.

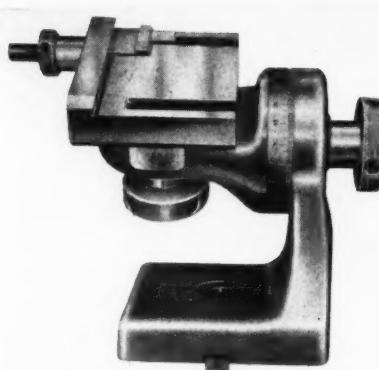
Rockford, Ill.

heavy shock loading and tool steel knife seats which may be added to convert the machine into a regulation billet shear.

The machine is available in sizes from No. 10 to No. 17 inclusive, with shearing tonnage pressures of from 325 to 2,200 tons. The main frame of the machine is made of all-welded rolled steel plate.

Grinding Fixture for Compound Rake and Lead Angles

Landis Machine Co., Waynesboro, Pa., has announced a chaser grinding fixture,



Landis No. 20 Chaser Grinding Fixture

CAMS

Our ROWBOTTOM cam cutting facilities are at your disposal for your cam requirements.

We Solicit Your Inquiries.

BLOOMFIELD TOOL CORP.
37 FARRAND ST. BLOOMFIELD, N. J.

An advertisement for the Mecco Safety Round Shank Type Holder. It features a large image of the holder itself, which is a cylindrical device with a knurled shank. To its left is a circular inset showing a hand using a tool to change type. Above the main image is a box containing the text "NEW SPEED and SAFETY FOR PRODUCTION MARKING". Below the main image, the words "Mecco SAFETY ROUND SHANK TYPE HOLDER" are printed.

With the knurled shank designed to permit a firm, positive grip, the Model RS Type Holder is made of Mecco Safety Steel to eliminate mushrooming and spalling. The type is interchangeable, and the holder can be made for either one or two lines of type. Includes patented snap slide for quick changing of type.

Write for literature.

M.E.C. CUNNINGHAM CO.
SAFETY STEEL STAMPS

1051 Chateau Street • Pittsburgh 33, Pa.

designated as the No. 20, which is primarily designed for use in grinding the compound rake and lead angles on Landis tangential chasers. According to the manufacturer, the fixture can be readily adapted for use on any grinding machine which has a traversing table regardless of the type grinding wheel it uses. The base of the fixture is constructed so that it can be clamped to a T-slotted table or held on a magnetic chuck according to the requirements of the user.

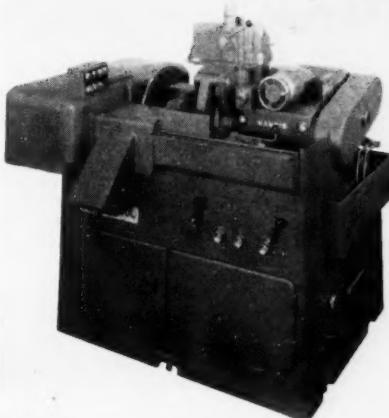
A crossarm, supported by the base casting, is arranged so that the chaser platen can be adjusted vertically, making possible the grinding of any desired rake angle. The platen can be rotated 360 degrees horizontally, thus providing an accurate means of producing the desired lead angle. The fixture is designed to handle chaser widths of from $1\frac{1}{4}$ to $4\frac{3}{8}$ inches. The fixture can also be used for chaser widths of from $\frac{7}{8}$ to $1\frac{1}{4}$ inches by the addition of a grinding block which is available on order.

An advertisement for the Mauser Precision Vernier Caliper. It features a large image of the caliper, which has a unique camlock mechanism. To the left of the caliper is a circular inset showing a hand using the tool. Above the caliper is the text "THE ORIGINAL MAUSER PRECISION VERNIER CALIPER". To the right is the price "\$14.75 PPD". Below the caliper, there is descriptive text: "NEW EXCLUSIVE CAMLOCK AND GIB IMPROVEMENT INSTANTLY FIXES SETTING, PREVENTS SHIFTING, GUARANTEES SQUARENESS OF JAWS. THE MAUSER TRADEMARK... IS YOUR PROTECTION." To the right of this is another box containing the text "MONEY BACK GUARANTEE FOR MEASURING INSIDE, OUTSIDE, AND DEPTH. 3 GRADUATIONS 1/1000" - 1/128" 1/10 mm. IN BACK". At the bottom left is the text "GEO. SCHERR CO. INC." and at the bottom right is the address "198A Lafayette St., N. Y."

Semi-Automatic Grinder Grinds Jet Blades

Landis Tool Co., Waynesboro, Pa., has announced a semi-automatic grinder designed for the rapid precision grinding of all types of blades, buckets, vanes, and nozzles now being used in current jet engine designs. Using a 24-inch diameter wheel, the machine can be employed for grinding the leading and trailing edges in addition to the external airfoil surface, platform, and platform radius. According to the manufacturer, twisted, warped, or broken-back contours, straight contours, and blades with parallel or non-parallel sides can all be precision ground on the grinder.

To grind a shape which varies from root to tip, the grinder utilizes a rocking cradle and master cam. As the grinding wheel traverses along the workpiece, the follower moves along the master cam. Master cams can be easily removed when changing from one contour to another. The grinding wheel is profile dressed and, in addition, a radius is dressed on the corner for grinding the radius adjacent to the straight platform. Automatic hydraulic wheel dressing is employed for generating this shape on the wheel. Hydraulic and electrical controls are grouped



Landis Turbo Jet Hydraulic Grinder

for convenient operation. Variable rates of hydraulic traverse are provided for both the wheelbase carriage and overhead dresser. Rates of hydraulic grinding feeds are variable and may be adjusted to suit the workpiece.

NEW!

KOEBELITE

Cemented Diamond Particles

More efficient than conventional single diamond tools—with MUCH LONGER LIFE.
Reduces set-up time—increases production.
Now ready and proven: Koebelite CDP (Cemented Diamond Particles) Tool for Ex-Cell-O and J & L Thread Grinders; at left.

KOEBEL DIAMOND TOOL COMPANY
9456 GRINNELL AVENUE, DETROIT 13, MICH.

FIRST to give diamond users the advantage of diamonds set in powdered metal



Gay-Lee Carbide Cut-Off Tool

carbide blade are single permanently

Carbide Cut-Off Tool

Gay-Lee Co., Clawson, Mich., has announced a standard solid carbide cut-off tool designed for use on Brown & Sharpe automatic screw machines. The steel hub and brazed to form a bonded unit. This

method of holding the carbide assures maximum support and minimizes carbide breakage and parting from the hub.

The tool is gashed to provide two cutting edges and is available in ten standard sizes designed for any size bar stock up to the capacity of the machine.

Universal Joint Drilling Head Is Adjustable to any Pattern of Holes

A universal joint drilling head which is said to be adjustable to any pattern of holes and is available with from 4 to 12 spindles has been announced by Errington Mechanical Laboratories,

New "Shop Tender" is more versatile

Mobile—or stays put!

As Tool Tender for machine units

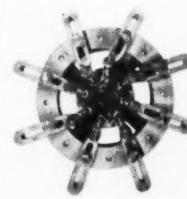
For Maintenance or Repair Work

For Laboratory or Mailing Room

As low as \$12.15

Here's the perfect all 'round auxiliary bench. Mobile, convenient, sturdy, low cost—saves hundreds of steps; speeds up work and production. Adjusts to 9 different heights. Has handy tool tray and steel drawer. Lower tray and top frame are "tension bolted" for permanent rigidity. Available with tough, long-wearing wood top (24" x 24" x 1 5/8") with drop sides and back—or steel trays; 3" diameter hard rubber wheel sets or caster sets. Choice of 12 models. For full details, specifications, prices, write for special Bulletin No. 310.

STURDI-BILT STEEL PRODUCTS, INC.
624 S. MICHIGAN AVE., CHICAGO 5, ILLINOIS

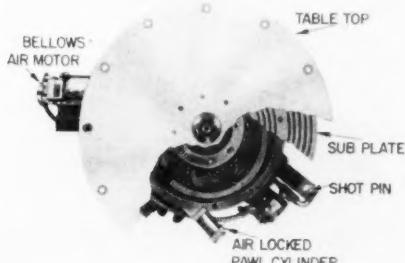


Errington Universal Joint Drilling Head

Inc., 24 Norwood Ave., Staten Island N. Y. The head features an all-aluminum housing construction, thrust bearings, and gears turned on spindles. The unit is available in two sizes designated as the No. 0 and the No. 1. The No. 0 has a capacity of from 0 to $\frac{1}{4}$ inch and is furnished with a full range of collets. The No. 1 has a capacity from $\frac{3}{16}$ to $\frac{1}{2}$ inch and is supplied with a No. 1 Morse taper socket or chucks for straight shank drills.

Rotary Index Table Is Air Powered and Electrically Controlled

Designated as the "Bret-26," an electrically-controlled air-powered rotary-index work feeder designed to position work



Bellows "Bret-26" Rotary Index Table

with maximum accuracy has been announced by The Bellows Co., P.O. Box 631, 230 W. Market St., Akron 9, Ohio. The table features a 26-inch diameter table top which is rotated by a 3 $\frac{1}{8}$ -inch bore air motor with full electrical con-

trol. According to the manufacturer, the standard table is set to index either 6, 9, or 18 stations with repeat index accuracy of plus or minus 0.001 inch. Additional stations are available on special order.

Around the perimeter of the table top are 18 equally spaced jig bored holes, tapered and bushed to $\frac{3}{8}$ -inch diameter. An auxiliary air cylinder, controlled by an Electroaire valve and synchronized to the movement of the table, drives a tapered shot-pin into the jig bored hole, thus positively locking the table in position. A built-in impulse switch provides a simple means for synchronizing the table with other machines or operations. Fixtures can be mounted directly on the table top or on a second table top which can then be mounted on the standard top.

Diamond Abrasive Packaged in Plastic

Elgin National Watch Co., Elgin, Ill., has announced a plastic cartridge to replace the glass cartridges formerly used for packing the company's diamond abrasive, "Dymo." The plastic cartridge is a precision tube sealed at both ends and designed for use with an applicator gun. The basic advantage of the plastic over

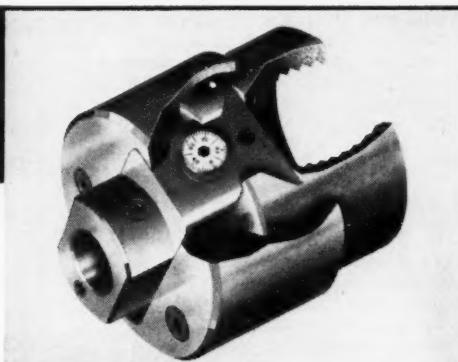
SAMSON Offset BORING CHUCKS

THESE JOB-PROVEN FEATURES WILL SAVE YOU TIME AND MONEY

- Quick tool change
- Positive dead-centering
- Precision offset adjustment
- Rugged tool support
- Safety round contour

Complete Boring Chuck
Accessories Available

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LAST WORD
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DRESSER



LAST WORD SALES CO. • 18500 Mt. Elliott • Detroit 34, Mich.

Jig in a Jiffy

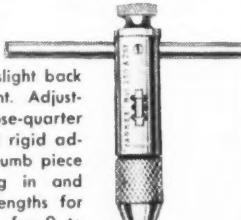


Shortcut costs on small jobs with this fast-acting, economical jig. Lock the work in the "Yankee" Angle Vise. Tilt for the angle and lock. You're set up for every operation . . . hand or machine. Also available with quick-release swivel base. Two jaw widths . . . 2" and 2 3/4". Each vise supplied with grooved "V" Block for holding rounds.

"Yankee" Ratchet Tap Wrenches

for tight spots

Ratchet needs only slight back and forth movement. Adjustable cross-bar for close-quarter work. R.H., L.H. and rigid adjustments. Knurled thumb piece for speedy starting in and backing out. Two lengths for 0 to $\frac{5}{16}$ " taps, one for 0 to $\frac{3}{16}$ " taps.



WRITE FOR "YANKEE" TOOL BOOK

NORTH BROS. MFG. CO.
Philadelphia 33, Pa.

YANKEE TOOLS
NOW PART OF

STANLEY
Reg. U.S. Pat. Off.

THE TOOL BOX
OF THE WORLD



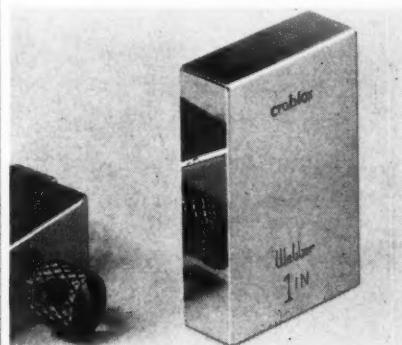
Illustration showing applicator gun and new plastic cartridge for "Dymo" Diamond Abrasive

the glass is the decreased chance of contamination of the diamond abrasive in the cartridge. Also, according to the manufacturer, the plastic cartridge will not break or crack if accidentally dropped. The new plastic cartridge is available in both 5 and 18-gram sizes.

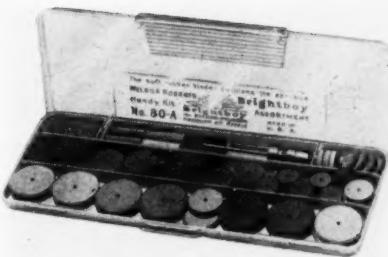
Gage Block Is Made of Chrome Carbide

A gage block made of chrome carbide which is said to provide for maximum corrosion resistance, as well as a remarkable similarity to steel in the coefficient of expansion, has been introduced by Webber Gage Co., 12899 Triskett Rd.,

Webber "Croblox" Chrome Carbide Gage Blocks



Cleveland 11, Ohio. Marketed under the trade name "Croblox," the gage block is light, non-magnetic, and is said to wring easily in block buildups. According to the manufacturer, a surface finish of 0.1 microinch is attainable, and the block can be exposed to a wide range of atmospheric changes without a single trace of rust. Two, three, and four-inch blocks are provided with bakelite finger grips to protect the blocks from the heat of the body.



Rubber-Cushioned Abrasive Kit for Finishing Operations

Brightboy Industrial Division, Weldon Roberts Rubber Co., 6th Ave. & 13th St., Newark 7, N. J., has announced a rubber-cushioned abrasive kit, known as the Handy Kit Assortment No. 80A, which can be used for finishing all metals, plastics, wood, glass, hard rubber, and laminated materials and combinations. Designed for use on light electric, air-powered hand, and bench machines, the wheels in the kit are said to combine the working advantages of both light abrasive and rubber, resulting in simultaneous burring, finishing, cleaning, and

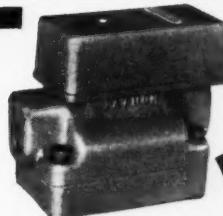
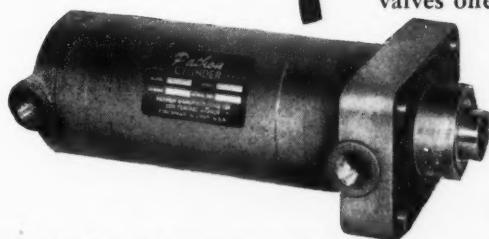
Brightboy Handy Kit Assortment No. 80A

polishing operations. Special surfacing effects are said to be obtained by regulating the speed of the machine and/or the pressure on the product which is being finished.

An assortment of small wheels and cylinders totaling 44 pieces most frequently used with light power equipment constitute the kit. A chuck and mandrel are also included. The assortment is available in an attractive, clear plastic case which measures approximately 8 x 3 x $\frac{1}{8}$ inches, making it convenient to carry in a pocket.

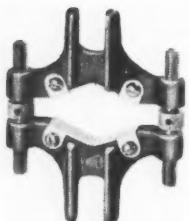
Pathon

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VALVES**



Compact, easy to install, Pathon 2000 P.S.I. Hydraulic cylinders and valves offer you efficient, trouble-free operation. Write for our catalog today.

**PATHON MANUFACTURING CO. 3827 PACIFIC AVE.
CINCINNATI, OHIO**



"Red-E" Universal
Grinding Machine
Dog

Universal Grinder Dog

Ready Tool Co., 540 Iranistan Ave., Bridgeport 5, Conn., has announced the "Red-E" Universal Grinding Machine Dog which features a brass face design that is claimed to minimize marring and damaging of soft, finished, or thread-

ed workpieces. According to the manufacturer, when the dog is opened to its greatest capacity, the drawing pins in the faceplate will not come in contact with the bottom of the slot.

The grinder dog is available in two styles. The No. 101 has a capacity of from $\frac{1}{4}$ to $1\frac{1}{2}$ inches, and the No. 102 has a capacity of from $1\frac{3}{8}$ to $2\frac{1}{2}$ inches.

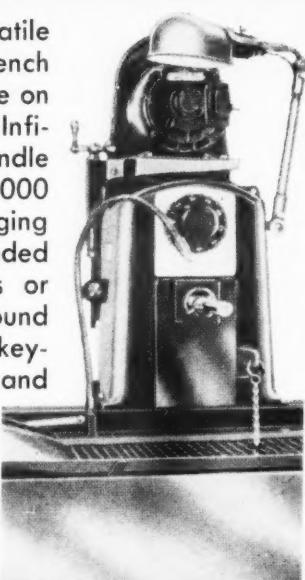
Circular Saw Features Pin-Locked Segments

Designated as the Disston Chromos, a metal-cutting saw which features segments that are locked together by flexible tightening pins has been announced by Henry

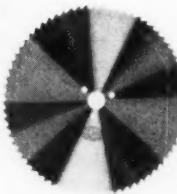
MODEL "J"

Superior BENCH TYPE HONING MACHINE

Here's the most versatile and economical Bench Type Honing Machine on the market today! Infinitely variable spindle speeds from 400 to 1000 R. P. M. with no changing of belts. No tools needed to change mandrels or stones. All stones ground to size. Will hone keyways, spline gears and most broken surfaces. Size 13" x $16\frac{1}{2}$ " x 25" high. Shipping weight only 120 lbs.



Superior HONE CORP.
1611 ELRENO ST. • ELKHART, INDIANA



Disston Chromos
Segmental Circular
Saw

Disston & Sons, Inc., 421 Tacony, Philadelphia 35, Pa. The patented locking design is said to ensure accurate alignment of the segments around the entire cutting edge and make possible quick replacement and alignment of segments.

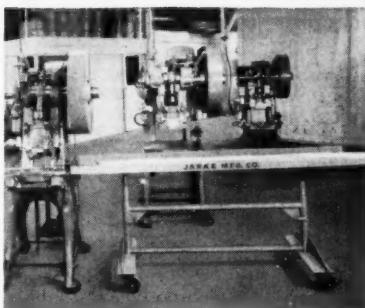
The saw is available in diameters ranging from 11 to 63 inches and with various tooth spacings for cutting any ferrous or non-ferrous metals. Center holes are drilled to user specifications to provide accurate fit.

Portable Stock and Feeder Cart Handles 2,000 Lb.

Designated as the "Steelmobile," a stock and feeder cart which is designed to transport and feed up to 2,000 lb. of steel sheet and bar stock to punch presses, shears, power brakes, cut-off machines, and so on, within industrial plants has been announced by Jarke Mfg. Co., 5407 N. Broadway, Chicago 40, Illinois.

The cart is said to be ruggedly constructed with a working top made of 10-gauge steel flanged on all sides for rigidity and to eliminate sharp edges. The table is adjustable in height from 32 to 42 inches and is inclinable to a maximum of 45 degrees to suit various press heights and angles.

Equipped with swivel-type high-load capacity free-running steel casters, the Steelmobile is said to be easily maneuvered while fully loaded. All pivot and lock-pins are hardened for long wear.



**Jarke "Steelmobile" Stock and Feeder Cart
in use**

Extra-heavy end flanges serve as mounting surfaces for oilers during feeding operations.

O.B.I. PRESS

HORN PRESS

DEEP THROAT

EFFICIENT - LOW COST PRODUCTION
MEANS
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PUNCH
PRESSES

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Service Machine Company

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S. Ashland Ave.
Chicago 20**

Desk Calendar Has "Future-Date Feature"

Designated as the 1953 "Schedule-A-Date," a desk calendar which shows at



"Schedule-A-Date" Desk Calendar

a glance future dates by days, weeks, and months for an entire year has been announced by Schedule-A-Date Calendar Co., 310 E. State St., Ithaca 22, N. Y. The calendar incorporates a "future-date fea-

ture" whereby the left-hand page for each day has a clear, concise, simplified listing of future dates grouped by days, weeks, and months for an entire year. The right-hand pages of the two-color calendar are regular memo pages with the date, a calendar of the month, and sufficient space for notes.

The complete Schedule-A-Date Desk Calendar includes a cold-rolled steel base with nickel arches and rubber feet. Pad pages are a standard $3\frac{3}{4} \times 6$ -inch size with holes spaced 2 inches apart for a side-opening stand. The complete stand and calendar pad are available together or the pad can be obtained separately.

Reversible Ratchet Provides Unusually Small Increments of Ratchet Action

Designated as the No. S-52, a reversible ratchet incorporating a concentric-type mechanism of 82-tooth action which is said to provide for unusually small increments of ratchet action has been added to its $\frac{1}{2}$ -inch square-drive "Supersocket" line by J. H. Williams & Co., 400 Vulcan St., Buffalo 7, N. Y. According to the

Enco

TURRET TOOL POSTS SAVE VALUABLE SETUP TIME

Send for Latest Catalog.

Also Mfg's. of complete line of Hexturrets and "MITI-MITE" Magnetic base tools.

12-position indexing.

Keeps setting accurately. Indexing is self-contained — eliminates all chip-interference. Accurate within .0005.

The three photos at right illustrate the flexibility of 12-position indexing, whereby each tool may be used in three different working positions.

→ **3/4" square tool bit mounted in Model 4 1/2-S turret used for facing cut.**

→ Same tool used for broadface turning merely by indexing turret one position or 30°.

→ Same tool used for inside chamfering merely by indexing back two positions or 60°.

ENCO Manufacturing Co., Dept. 1112
4524 W. FULLERTON AVE., CHICAGO 39, ILL.

Reasonable Deliveries



Williams No. S-52 "Supersocket" Reversible Ratchet

manufacturer, the ratchet "shifter" is easily accessible and permits instantaneous reverse action and one-hand operation. The handle is knurled to afford the operator a firm, safe grip. The ratchet is made of selected alloy steel which is heat treated, polished, and chrome plated.

Mass. The gage is made of fine steel with a fine-ground finish on all surfaces. The bar is hardened with machine divided graduations, and the bottom of the base and the scribe are hardened and lapped. The scribe is easily removable for sharpening or for substituting a dial indicator or other attachments. The vernier plate is adjustable to maintain the zero point in the event of wear.

With the addition of the 12-inch size, the Starrett No. 454 line of vernier height gages are available in 12, 18, and 24-inch sizes. Gages with ranges of 36 and 48 inches can be readily furnished on special order.

Vernier Height Gage Has Full 12-Inch Range

A vernier height gage with a 13-inch scale which is said to permit taking

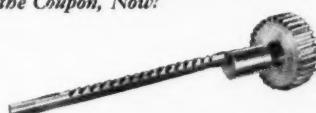


Starrett No. 454 Vernier Height Gage

accurate measurements over a full 12-inch range in thousandths of an inch has been added to its line of No. 454 vernier height gages by The L. S. Starrett Co., Athol,

If CUTTING KEYWAYS For a PENNY-A-PIECE Would Save You DOLLARS

It will bring you the complete catalog on Minute Man KEYWAY BROACH KITS—show you how you can broach any standard width from $1/16''$ to $1''$ in any bore from $1/4''$ to $3''$ by hand IN ONE MINUTE for as little as a penny a keyway. And you'll get a lot of valuable Keyway reference data, too! Mail the Coupon, Now!



SEE IT AT BOOTH 112—PLANT MAINTENANCE SHOW, Cleveland

The du MONT CORPORATION, Greenfield, Mass.

Please mail catalog and price list S on
Minute Man Keyway Broaches and Kits to:

Name.....

Company.....

Address.....

Diamond Tool Designed for Dressing Thread-Grinding Wheels

A tool, known as the Diamond Grit Tool, designed for dressing thread-grinding wheels which grind threads ranging in pitch from coarse to fine has been announced by Wheel Trueing Tool Co., 3200 W. Davison Ave., Detroit 6, Mich. The tool is available in models for thread grinding machines which grind vee or straight-line threads for production or gage work.

The cutting element of the tool is a concentrate of selected diamond grits and an

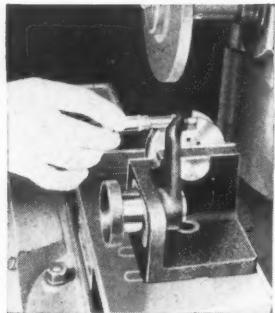


Wheel Trueing Diamond Grit Tool

alloy matrix. According to the manufacturer, the wear ratio of the matrix is such that grits are always exposed, and there are always sharp points in action until the tool is worn out. The tool is said to present a cutting face in any position and needs only occasional turning to assure effective dressing operations.

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WELDON



CIRCULAR FORM TOOL SHARPENING and MEASURING FIXTURE

The Weldon Circular Form Tool Sharpening and Measuring Fixture is a convenient and accurate aid in sharpening and measuring of all sizes of high speed steel or carbide tipped circular form tools. Insures maintaining the original shape of form tool by keeping proper relationship of cutting face to center line of tools.

The micrometer measures the correct distance the cutting face should be below center line of tool. The fixture may be used on any surface grinding machine.

Write for descriptive folder No. CGM 1-49

Weldon distributors throughout U.S.A. and Canada
carry complete stocks to serve you.

THE WELDON TOOL CO. *Cleveland 4, Ohio*
3000 WOODHILL ROAD

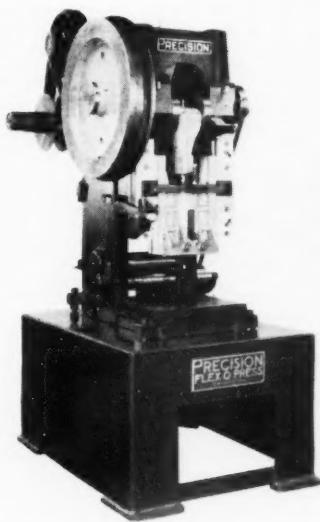
Lubricant May Be Sprayed or Brushed

Known as "Lubond," an air dry lubricant which may be sprayed or brushed on steel, iron, stainless steel, lead foil, aluminum, brass, wood, cork, and so on, has been announced by Electrofilm Corp., 7116 Laurel Canyon Blvd., North Hollywood, Calif. According to the manufacturer, Lubond has excellent lubrication characteristics at temperatures ranging from minus 70 to 300 deg. F. and is resistant to hydraulic fluids, gasoline, lubricating oils, and water.

Lubond is recommended by the manufacturer for hinge pins, hydraulic cylinders, gears, threads, tracks, springs, floats, bolts and nuts, actuator screws, and a wide variety of other products.

High-Speed Automatic Stamping Press Has 30-Ton Capacity

Designated as the "Flexopress" Model C-30, a high-speed automatic stamping



"Flexopress" Model C-30 High-Speed Automatic Stamping Press

press with a capacity of 30 tons and available with either an air or shot pin clutch has been announced by Precision Welder & Flexopress Corp., 136 E. McMicken Ave., Cincinnati 10, Ohio. The feed rolls are built as an integral part of the machine and are said to be infinitely adjustable through an overrunning clutch from 0 to 12 inches of feed. The press ram is contained on a multiple of ball bearings

which operate in hardened and ground tool-steel raceways to ensure accurate alignment at all times.

Provided with a 2½-inch standard stroke, the machine has a speed which is adjustable from 110 to 450 strokes per minute. The press incorporates square pillar blocks which are cross bolted for journal bearings with replaceable inserts, and a heavy brake band which is anchored to the clutching arm. According to the manufacturer, the press is capable of stamping materials ranging from 0.0002-inch thick aluminum foil, plastics, and gasket materials to heavy metals within the range of its 30-ton capacity.



"SHUR-GRIP" DROP FORGED HANDLES

Designed to hold 3 to 6 lb. lead hammer heads more firmly—will not slip—keeps hammer head in shape longer—to make remolding easier, quicker, surer, less expensive. Write for folder.

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67 Massasoit Ave. E. Providence 14, R. I.

AT LAST!

A Low-Priced Dial Type Indicator

Has 2 contacts 1/32" threaded within 1/8". Double Faced. Reads front and back. Two Crystals. Double faced dial indicator complete with plated holder including 1/32" and 1/8" contacts—

Black Pentrate	\$6.95
Satin Chrome	7.95
1/32" Contact, 1/2" long extension	.75

SUPERIOR INDICATOR CO.
P.O. Box 734 Rochester 3, N. Y.



GILMORE DIAMOND TOOLS



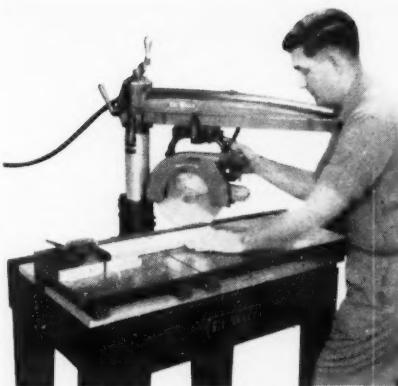
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F. F. GILMORE & CO., INC. • 285 COLUMBUS AVE., BOSTON 16, MASS.

1-H.P. Metal Cutter Makes Straight Cut Off, Miter, Bevel, and Compound-Miter Cuts

DeWalt Inc., Subsidiary of American Machine & Foundry Co., Lancaster, Pa., has announced a 1-h.p. radial arm machine, designated as the Model GW, which is designed to perform straight cut-off, miter, bevel, and compound-miter cuts on light metals. According to the manufacturer, only a few seconds are needed to swing the arm or motor to any angle for miter or bevel cuts. The machine can be used with metal-cutting saw blades



DeWalt Model GW 1-H.P. Radial Arm Machine

READING BENCH KEYSEATER

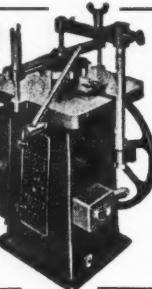
Portable—move directly to job; a time saver for both small and large shops.

3 $\frac{3}{4}$ " stroke; adaptable for other work.

Low first cost—prompt delivery.

Good dealers wanted.

READING MACHINE CO.
CINCINNATI 37, OHIO



GRAY TURRET HEAD METAL CUTTER OR NIBBLER

N.A.M. Pioneer Award
Given to Gray

Most modern Nibbler for Template Cutting, Tool Rooms, Shipbuilding, Aircraft Parts, Aircraft Tubing, Sheet & Plate Shops.

GRAY MACHINE CO.

Box 596, Philadelphia, Pa.



BOSTON UNIVERSAL ANGLE PLATE

A Precision Tool
that Holds Work
at Any Desired
Angle.



Horizontal motion is 360 degrees; vertical motion, 120 degrees. Fitted with vernier scale reading to 5 minutes.

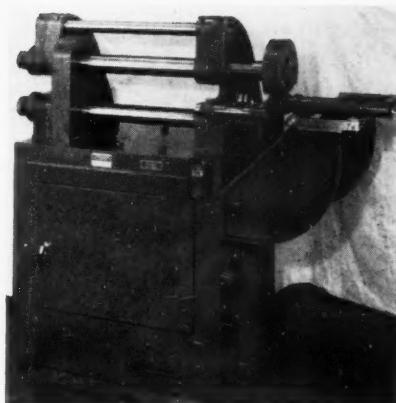
Puts Speed and Profit into Angular Drilling, Milling, Planing, Shaping, Grinding

With a Boston Universal Angle Plate on the job, work is quickly set up on the table and but a few seconds are required to locate it at the desired angle. Indispensable in tool rooms and extremely useful in production runs, the Boston Universal pays for itself many times over by eliminating the necessity of expensive jigs and fixtures.

Made in several stock sizes. Write today for full information.

US AUTOMATIC BOX MACHINERY CO., Inc.

10 ARBORETUM RD.
BOSTON 31, MASS.



Carlson Model 51 Wire Cutting Machine

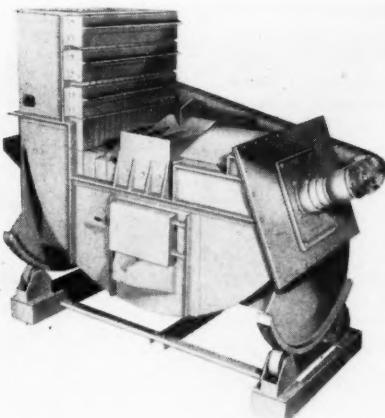
can be easily set up for adjustment of wire to be cut.

The wire cutting machine is 62 inches long x 30 inches wide x 57 inches high and weighs approximately 1,700 lb. It can be set to cut any length of wire required.

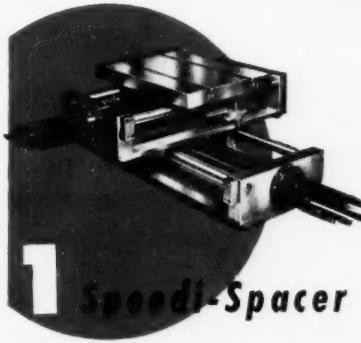
Reverberatory Furnace for Melting Ferrous and Non-Ferrous Metals

A non-crucible direct-fired reverberatory furnace designed for melting fer-

Eclipse Reverberatory Furnace



Time savers in any shop



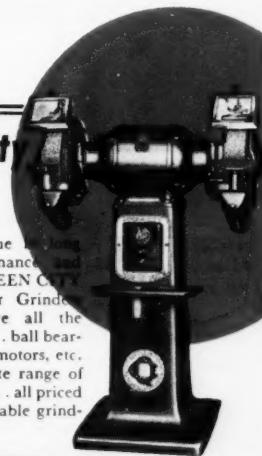
1 Speedi-Spacer

This jig-for-all-jobs makes any good upright or radial drill the equal of an expensive jig borer in speed and accuracy. SPEEDI-SPACER saves the cost of and waiting for, jigs and fixtures, as well as their storage, obsolescence and maintenance. Does big jobs fast at lowest cost.

2

Queen City Grinders

Here's extra value in long life, low maintenance and low first cost. QUEEN CITY Bench and Floor Grinders and Buffers have all the quality features . . . ball bearings, heavy duty motors, etc. . . . in a complete range of sizes and models . . . all priced far below comparable grinders and buffers.



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MACHINE TOOL CO.

WRITE TODAY FOR
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QUEEN CITY MACHINE TOOL CO.
233 E. 2nd Street, Cincinnati 2, Ohio

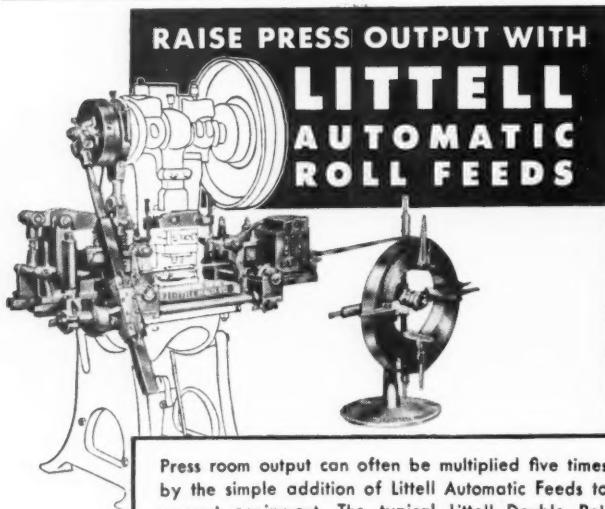
rous and non-ferrous metals has been announced by Eclipse Fuel Engineering Co., 1002 Buchanan St., Rockford, Ill. The furnace features a continuous charge and continuous pour operation, thus minimizing time between pouring and recharging. The combustion chamber of the furnace is designed to provide maximum combustion, and the hopper in which the metal is charged has a restricted opening at the bottom to prevent cold metal from contacting the molten metal.

The furnace is capable of producing either large or small heats and is fired by oil or gas fuels. Standard models with bath capacities ranging from 300 to

4,400 lb. are available; however, the furnace can be built to meet specified requirements.

Side Milling Cutter Is Designed to Slot Armor Castings

Detroit Milling Cutter Co., 28625 Grand River Ave., Farmington, Mich., has announced the addition of a staggered-tooth, solid carbide blade, side milling cutter to its line of "Futurmill" cutters. Designed primarily to mill a 1½-inch slot in an armor casting, the 9-inch 18-blade cutter incorporates solid carbide blades which have a ¼-inch radius ground on each corner and, when dull, can be simply indexed to another



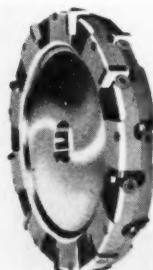
Installed on old or new equipment

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**LITTELL
MACHINE CO.**

WHEN YOU BUY FROM LITTELL...YOU PURCHASE A PACKAGE OF SATISFACTION



"Futurmill" Staggered-Tooth Side Milling Cutter

cutting position. Eight indexes in all are possible, with size being maintained within 0.001 inch.

With this design of cutter, the minimum width is approximately 1¼ inches where the teeth are staggered as shown in the illustration; however, straddle mills designed to cut on one side only can be made to a minimum thickness of 1 inch or more, depending on the size blade to be used.

Micro Alignment Telescope

A micro alignment telescope which is said to check point alignment to 0.001-inch accuracy over distances from 18 inches to more than 150 feet has been announced by Engis Equipment Co., 431 S. Dearborn St., Chicago 5, Ill. According to the manufacturer, the telescope also permits the determining of squareness of mirror targets through built-in auto reflection. The instrument has a hardened, ground, and chromium-plated steel barrel and built-in optical micrometers, providing for magnification of 30X and 45X.

For setting the telescope truly horizontal, a stride-level is provided which has precision split-bubble reading. Where micrometer reading of displacement is not required, the instrument is furnished in a simplified form without built-in optical mirrors. For precision point and tilt alignment, an aligning tube is supplied, consisting of a hardened, precision ground, and chromium-plated barrel with two built-in targets at a distance of 10 inches. Targets in 1½ and 2½-inch diameters to



(Upper left) Micro Alignment Telescope equipped for auto-reflection and auto collimation; (Center) Micro Alignment Telescope without optical micrometers; (Lower right) Micro Alignment Telescope equipped with spherical adapter and prismatic stride level.

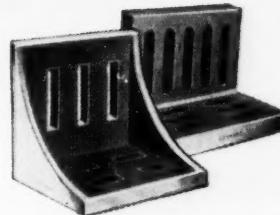
A.I.A. standards are of hard glass and are said to provide permanent and easily-cleaned reference points for alignment.

Victor's Specials Deserve Your Attention!

ECLIPSE ANGLE PLATES

Accurate . . . Rugged

Eclipse Angle Plates are available in "Webbed End" and "Open End" patterns. Made from high quality castings and seasoned before machining to prevent distortion. All faces of Open End and outside faces and edges of Webbed End patterns are machined square and parallel.



WEBBED	COST	LENGTH	1 st ANGLE	2 nd ANGLE	OPEN END	COST
No. 199	\$ 2.50	3"	2½"	2"
No. 200	3.25	3½"	3"	2½"
No. 201	4.25	4½"	3½"	3"	No. 301	\$ 5.50
No. 202	5.50	6"	5"	4½"	No. 302	7.75
No. 203	7.00	7"	5½"	4½"	No. 303	9.25
No. 204	9.00	8"	6"	5"	No. 304	11.50
No. 205	11.50	9"	7"	6"	No. 305	14.50
No. 206	17.00	10"	8"	6"	No. 306	18.50
No. 207	22.00	12"	9"	8"	No. 307	24.00

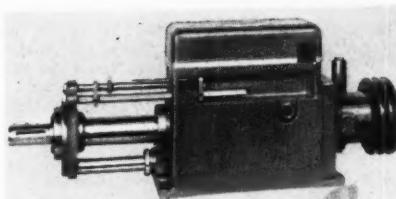
VICTOR MACHINERY EXCHANGE, INC.

DEALERS IN TOOL ROOM EQUIPMENT

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Drilling Unit Can Be Mounted on Machines in Any Position

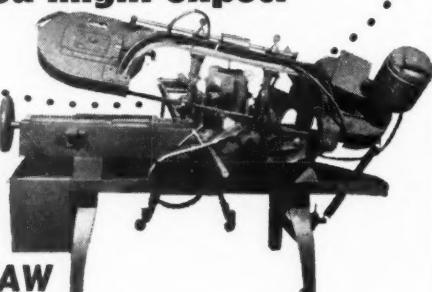
Designated as the "Drillunit," a small self-contained drilling unit which can be mounted on a machine in any position for drilling and boring operations has been announced by Drillunit, Inc., 637 Mt. Elliott, Detroit 7, Mich. The unit incorporates a spindle, which is direct-driven by an electric motor, and push-button controls. According to the manufacturer, the unit has a traverse rate of over 400 inches per minute, a feed rate up to 30 inches per minute, and a capacity of $\frac{1}{2}$ inch in



"Drillunit"

steel. Speeds, it is claimed, can be varied by changing sheaves and belts, and multiple heads can be mounted to the flange of the quill.

Get the advantages of AUTOMATIC BAR STOCK CUT-OFF at a fraction of the cost you might expect



with a
WELLS SAW
and **WELLS-O-BAR Feed Master**

A set-up for automatic repetitive cutting need not be prohibitively expensive. By combining a Wells Metal Cutting Band Saw and a Wells-O-Bar Feed Master you can automatically cut any quantity of identical lengths of bar stock with a modest investment. See your Wells Dealer for complete information or write direct.



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**METAL CUTTING
BAND SAWS**
WELLS MANUFACTURING CORPORATION
808 TYLER ST. - THREE RIVERS, MICH.

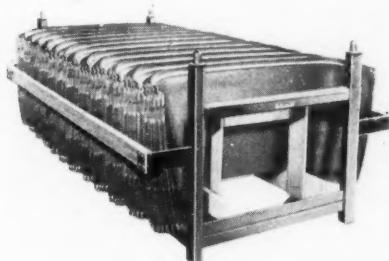
Floor Resurfacer

Flexrock Co., 3615 Filbert St., Philadelphia 4, Pa., has announced a floor resurfacer which is said to combine the durability of concrete with the flexibility of wood. According to the manufacturer, the resurfacer is designed to withstand heavy industrial use and vibration and will not splinter, warp, or crack. The material is also said to be capable of withstanding heavy abrasive traffic and any weight the substructure will bear. Application is claimed to be easy, and the floor is ready for use overnight.

The resurfacer is available in five colors plus natural and is supplied in one complete unit—no other materials being needed for application.

Stock Rack Can Be Equipped with Side Rails

A standard portable stacking-type stock rack which is equipped with bayo-



Stock rack equipped with side rails

net cutouts in the uprights for attaching side rails has been announced by Equipment Mfg., Inc., 21550 Hoover Rd., Detroit 5, Mich. The rails, made of hard wood with formed metal fittings, are said to assure good load balance for safe

movement and stacking of bulky and overhanging loads. Both flush and extended-type rails are available.

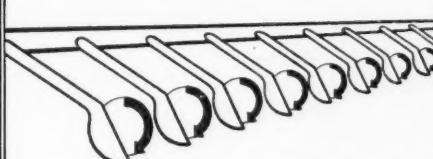
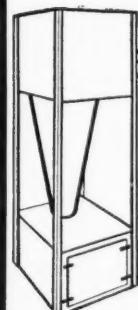
The attaching mechanism involves no bolts or loose parts, and rails can be locked in position or disengaged for loading and unloading by simply lifting and tipping.

Safety Guard Designed for Any Size Punch Press

Designed for use on punch presses of all sizes, makes, and types, a basket enclosure-type guard announced by Searjeant Metal Products, Inc., Box 87, Mendon, N. Y., is said to meet the most exacting safety requirements and is available in several sizes, each custom built to user specification. The front and side barriers can be tilted in or out as required while the vertical rods can be adjusted up or down to clear the die straps, air nozzles, and so on. The entire front barrier can be easily and quickly taken off to remove double or damaged blanks from the die.

The corner locking knuckles of the guard are designed so as to firmly clamp the round supporting bars without mar-

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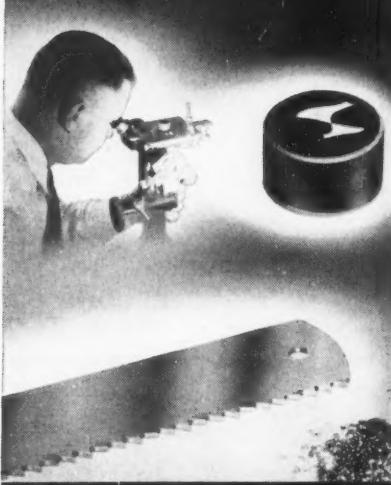
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207 Main St. Ann Arbor, Mich.

300 cfm to 10,000 cfm per unit (22 models) standard, pre-tested, available from stock.

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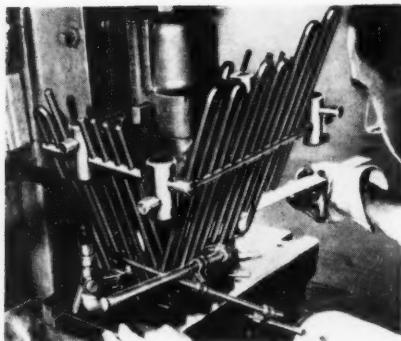
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**SAW BLADE SPECIALISTS
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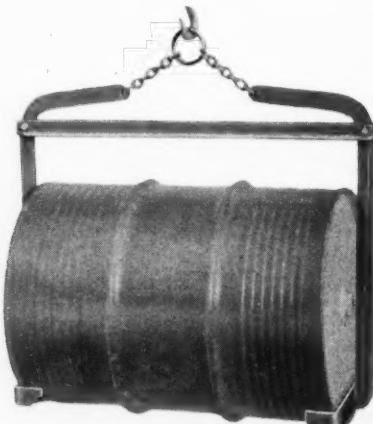
Searjeant Safety Guard in use

ring them. Slotted mounting brackets permit quick, easy installation or removal of the guard. A clear-view front can be supplied and is easy to install in place of some of the vertical rods, thus enabling the operator to have an unobstructed view of the die and work area.

Barrel Cradle Will Handle up to 1,000 Pounds

A barrel cradle designed for picking up any shape barrel, plywood or fiber drum with straight or bilged sides, flat

Palmer-Shile Barrel Cradle



or chimed ends has been announced by Palmer-Shile Co., 16022 Fullerton Ave., Detroit 27, Mich. The cradle, built to accommodate a barrel of from 20 to 25 inches in diameter and from 32 to 36 inches in length, is made of heavy bar stock and has a capacity for handling 1,000 lb. Special sizes can be made to meet special requirements.

Drawer Units Can Be Assembled in Various Combinations

Standard Pressed Steel Co., Box 556, Jenkintown, Pa., has announced welded, all-steel drawer units which can be bolted together in scores of different combinations. The drawers are designed primarily for use on top of one another in tiers of from two to five or more but can also be used singly. Constructed of heavy-gauge steel, the units are completely enclosed and can be assembled to stand on the floor, in cabinets, or on bench tops; to hang from bench tops; or for fastening to tool stands and desks.

Drawer handles are recessed for safety, and padlock attachments are standard equipment. Cylinder locks and sliding



Standard Drawer Units in use

trays are available as extras, as well as bases which can be used when the tier is to stand on the floor. The units are available in three standard sizes: 14 inches wide x 15 inches long x 5 inches deep; 14 inches wide x 20 inches long x 5 inches wide; and 20 inches wide x 20 inches long x 6 inches deep.

H U P P E R T Model 11 FM FURNACE

PRODUCTION RUGGEDNESS!
LABORATORY ACCURACY!



Consistent temperature - controlled heat output of this heavy-duty electric furnace has found wide acceptance in the tool and die industry. Laboratories too have found trouble-free operation and close temperature control a great asset to their closely budgeted operations. This dependable furnace features — special alloy elements, fully enclosed contracts, snug fitting counterbalanced

sliding door, °F. or °C. pyrometer and removable porcelain tray. Model 11 FM is available in 220 volt A.C., single phase, max. load is 4 KW., maximum temperature range — 2000° F. The inside dimensions measure 8" wide by 6" high by 12" deep. The stand is fabricated of 1½" x 1½" x ¼" angle iron and finished with two coats of black krinkle finish. A convenient service shelf is 12" above the floor.

Complete with automatic temperature control \$490.00
OTHER HEAVY-DUTY MODELS:

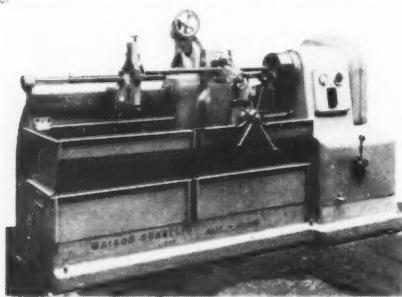
Price	Model No.	Inside Dimensions	Max. Temp.	KW
\$530.00	869 FM	8" x 6" x 9"	2200° F.	4
570.00	12 FM	8" x 8" x 12"	2000° F.	6
650.00	12A FM	9" x 8" x 12"	2000° F.	9

Write today for literature on complete line of Huppert Furnaces and ovens in floor and table models.

K. H. HUPPERT CO. 6841 Cottage Grove Avenue
Chicago 37, Illinois
Manufacturers of Electric Furnaces and Ovens

Thread Generating Machine Cuts Workpieces without Indexing

George Scherr Co., Inc., 198A Lafayette St., New York 12, N. Y., has announced a new model of the Cornelis Thread Gener-



Cornelis Thread Generating Machine

ating Machine which is said to be designed to cut screw threads, lead screws, and worms by an improved generating method that requires no indexing. According to the manufacturer, all starts of the thread are developed at the same time,

thus eliminating spacing inaccuracies caused by indexing from one thread to the other.

The machine has a diameter capacity of from $\frac{5}{8}$ to 4 inches and has a spindle speed ranging from 60 to 900 r.p.m. The machine incorporates a hollow spindle which operates in SKF Taper roller bearings, thus providing for accurate adjustment and minimizing axial play. The machine bed is of a rigid reinforced design, and the carriage ways are square with adequate bearing surface. The machine is powered by a 5 h.p. motor which has a speed of 1,500 r.p.m.

Micrometer Stop-Countersink Features Non-Rotating Head

Severance Tool Industries, Inc., 724 Iowa Ave., Saginaw, Mich., has announced a micrometer stop-countersink which features a non-rotating head and positive-locking adjustment. The unit is adjustable in increments of $1/1000$ inch, thus enabling precision countersinking operations to be performed from zero to the maximum countersinking depth adjustment of the cutter. According to the manufacturer, the unit is fastened to the op-

**Chicago
MOUNTED Wheels**

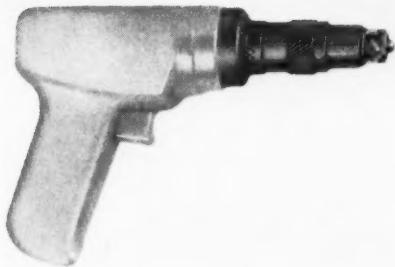
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even better with
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grinding wheel bond**

Greatest selection of sizes and shapes for every application. Best of all, deliveries are good . . . ready when you need them.

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CHICAGO WHEEL & Mfg. Co.
Dept. MMS, 1101 West Monroe Street, Chicago 7



Severance Micrometer Stop-Countersink
attached to operating gun

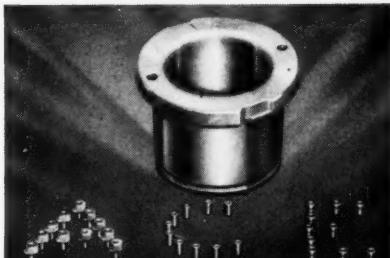
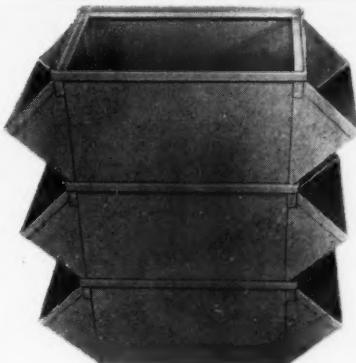
erating gun by a method that gives the gun a short overall length, thus reducing overhang to a minimum and making it possible to work in close quarters.

Stacking Bin Features Two Open Ends

Stackbin Corp., 1083 Main St., Pawtucket, R. I., has announced a stacking bin with two open ends which is designed to serve two operators at the same time during continuous assembly operations. According to the manufacturer, the bin can be reloaded quickly, and materials or components are instantly visible and accessible from both ends.

The bin is constructed of heavy gauge steel and incorporates a built-in positive stacking assembly. Index card holders are provided on each end, and the bin is finished in baked-on green enamel.

Stackbin Double-End Stacking Bins



ANY SIZE? Yes, sir!

Your special size may be standard with us. Whatever the size, if it's an ACE DRILL BUSHING you can depend on highest quality, manufacturing precision and prompt delivery. . . For the best, ALWAYS SPECIFY ACE!

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Industrial Diamonds

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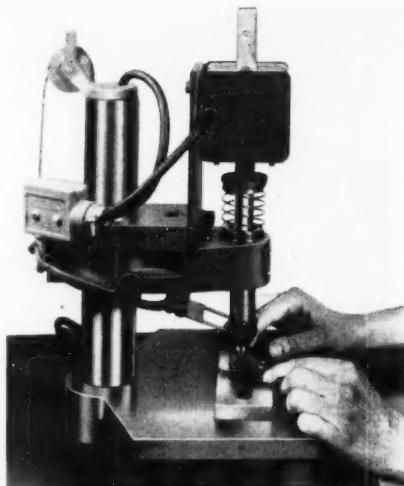
CLIPPER DIAMOND TOOL CO., INC.
21-C W. 46 ST. N.Y. 19



All-Electric Staking Machine Features a Solenoid- Operated Stroke

Designated as the "Electrostake," an improved portable all-electric staking machine which is operated by a solenoid and designed for assembly-line operation where two or more small assembled parts must be pressed firmly together and staked or riveted with a sharp blow has been announced by Black & Webster, Inc., Dept. N80, 445 Watertown St., Newton 58, Mass. The machine consists of an adjustable bracket which is mounted on a base and column and supports the solenoid that automatically delivers the power stroke. According to the manufacturer, the staking blow cannot be delivered until the pressure pad is in full contact with the work, thus protecting the operator. Both the staking blow and the hold-down pressure of the machine are adjustable and remain the same until they are readjusted.

The entire bracket assembly and hold-down sleeve can be easily raised or lowered to accommodate a wide variety of work sizes. The hold-down pressure, it is claimed, can be preset from a few ounces to 10 lb. and does not vary during the



Black & Webster "Electrostake" Staking Machine

staking operations. The machine is operated by a foot treadle and is available

How to speed production NEW! Illuminated with MAGNIFIERS 10X Pocket Magnifier



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WRITE for new handbook and catalog, "Industrial Magnifiers—How to Choose and Use Them." Bausch & Lomb Optical Company, 50511 Bausch St., Rochester 2, New York.



BAUSCH & LOMB

Magnifiers



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in three models with striking blows up to 3,000 lb. A blank tool set consisting of a hold-down pad which screws into the nose of the hold-down sleeve and a punch or staking tool which operates through the hold-down pad is supplied as standard equipment.

Thread-Rolling Machine Accommodates Either Hollow or Solid Workpieces

D. H. Prutton Machinery Co., 4134 W. 140th St., Cleveland, Ohio, has announced



Prutton Model 300 "Rollmaster" Thread-Rolling Machine

a thread-rolling machine, designated as the Model 300 "Rollmaster," which is said to perform equally well on either hollow or solid work in a wide variety of metals ranging from non-ferrous metals through aluminum and magnesium to hardened and stainless steels. According to the manufacturer, the machine can roll external Class 3 fit threads in $\frac{1}{2}$ -inch 13-thread hollow set screws of S.A.E. 1035 steel at a rate of 19,440 pieces per hour.

Pieces are hopper-fed and are rolled at close intervals around the circumference of the die. The machine is designed to handle a large number of workpieces at one time.



Atlantic

SKIP-TOOTH BLADES!

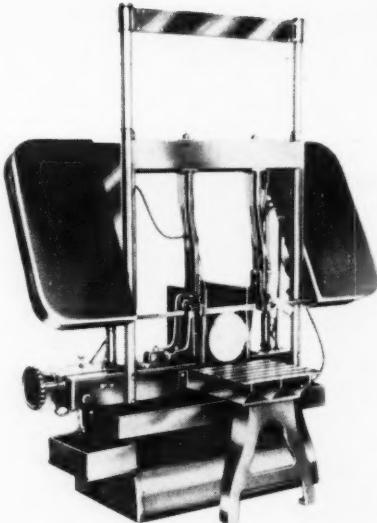
Keep abreast of changing production techniques! A finer, quicker cut on increasingly popular plastic — wood — copper — aluminum — and similar metals is YOURS with versatile Atlantic Skip Tooth Blades. Atlantic's extra wide tooth spacing whisks away chips — ends clogging! binding! heating! The rigid set of individually gauged teeth, the advanced skip tooth design promote increased accuracy and greatly prolonged blade life. Heat hardened teeth on special steel body eliminate most costly blade breakage, damaging crystallization. Whatever your blade requirements are — or may be — investigate the Atlantic Skip Tooth — another triumph of Atlantic adaptability and efficiency.

SEND TODAY FOR LITERATURE ON
SUPERIOR ATLANTIC BAND SAWS!

Atlantic
ATLANTIC SAW MFG. COMPANY, Inc.
Brewery St., New Haven, Conn.

Metal-Cutting Band Saw Has Unusually Large Capacity

Designated as the Model J-24, a band sawing machine which incorporates four band wheels to provide a capacity of 24 x 24 inches has been announced by W. F. Wells & Sons, Three Rivers, Mich. The machine is said to be completely hydraulic and has a maximum clearance under the blade of 25 inches. The Model J-24 utilizes a 16-foot 9-inch x 1½-inch x 0.035-inch blade and a vise that can swivel 45 degrees in either direction. According to the manufacturer, cutting speeds of 60,



Wells Model J-24 Metal Band Sawing Machine

New NESTING TYPE
TOTE PANS

20" Long x 12"
Wide x 6¼" Deep
16 Ga., drag holes,
handles both ends.

J. L. LUCAS & SON, INC.
BRIDGEPORT 5, CONN.

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Shipment on
**TAPER
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9" to 36" Swing
Write for Bulletin

MASTER-TAPER COMPANY
4431 N. Beacon St., Chicago 40
Excl. Mfrs. of Taper Attachments

\$29.50
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\$149.50

90, and 120 feet per minute can be obtained with the machine. The employment of a truss is said to provide maximum rigidity to the columns.

The machine incorporates a 1-h.p. blade motor and a ½-h.p. hydraulic motor, and occupies 38 x 78 inches of floor space.

Bench Model Bending Brake Bends 18-Gauge Sheet Metal

Designated as the Size BB-2, a bench model, hand-operated, universal, box and pan bending brake designed to bend sheet

MICROFLAT

COLLINS
BLACK GRANITE SURFACE PLATES

Present an absolute continuous bearing surface, finished up to 50 millionths inch. Incredibly smooth. Falling objects do not cause humps. Being harder than

hardened steel, can take greatest mis-treatment without causing inaccuracy of surface. No oiling. Will not rust or warp. No re-scraping. Most durable.

COLLINS MICROFLAT CO., 2326 E. 8TH ST., LOS ANGELES 21, CALIF.

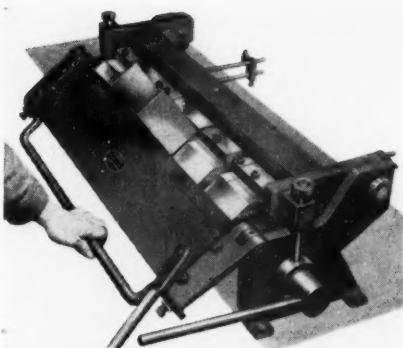
PERFECT PRECISION

Avoid substitutes

Immediate delivery in most sizes from 9x12 to 48x144.

REQUEST BULLETIN
and name and address of Distributor nearest you.





"Chicago" BB-2 Bench Model Bending Brake

metal up to 18 gauge thickness and 24 inches in length has been added to the "Chicago" line of bending brakes marketed by Dreis & Krump Mfg. Co., 7418 S. Loomis Blvd., Chicago 36, Ill. Designed for quantity runs on duplicate parts, the machine is said to be capable of making maximum angle bends of 135 degrees and minimum reverse bends of $\frac{1}{4}$ inch.

The bending edge of the brake consists of fingers in graduated widths fitted to a bar. The fingers can be easily adjusted or removed as the work requires, and may be used in any combination along the bending edge for folding, box and pan work, and a wide variety of straight bending operations. A positive cam-action clamp holds the work in position and can be quickly adjusted to compensate for different thicknesses. The bending leaf is a steel plate hinged in needle bearings, and the angle of the bend is controlled by an adjustable stop.

Hack Saw Has Capacity of 9 x 9 Inches

Designated as the No. 5 Hy-Duty, a power hack saw which has a capacity of 9 x 9 inches has been added to the Keller line of hack saws marketed by Sales Service Machine Tool Co., 2355 University Ave., St. Paul 4, Minn. The saw is provided with a cabinet base, automatic lift on the reverse stroke, and foot lever to help hold the frame in position while loading, unloading, or setting the saw for desired material length. A variable power pres-



"Stack Up"

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Once you use and compare Sterling stacking boxes, you'll know why we invite comparison in design, construction, and price. Our "Top Rim" construction provides stronger support all around the box . . . no corner inserts to become loose and fall out. Efficiency in designing and manufacturing allows us to quote favorably on any type or size stacking box.

Write for literature and prices.

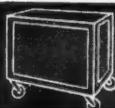
Sterling Factory Equipment Co., 183 Charles St., Providence, R. I.



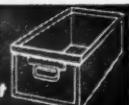
Sterling Bin Front "Top Rim"
Steel Stacking Box.
Size: 18" x 12" x 6".



Sterling "Top Rim" Steel Stack
Box with drop handles.
Size: 18" x 12" x 6".



Sterling
Quality Handling & Storage Equipment



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PRECISION COUNTERS

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LOW COST!

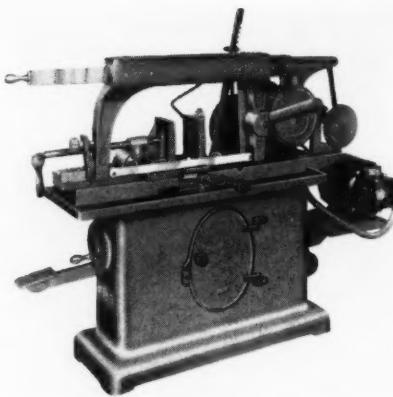
IDEAL FOR Punch Presses, Screw Machines,
Printing Presses, Drill Presses, Die Casting
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DITTMORE & FREIMUTH CO.
2517 E. Norwich Ave., Cudahy, Wis.



Keiler No. 5 Hy-Duty Power Hack Saw

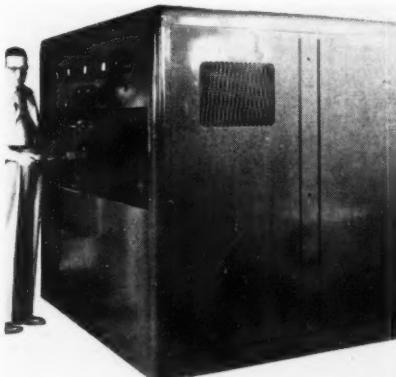
sure regulator is said to provide pressure from 0 to 200 lb. to the blade, enabling the saw to cut a wide variety of material.

The saw is equipped with a swivel base vise which has quickly adjustable sliding jaws. Standard equipment of the saw includes an automatic stop switch, a hinged motor bracket for automatic take-up of the belt, and a 1 h.p. motor.

Induction Heating Unit Provides 50 Kw. at 400,000 Cycles Per Second

Designated as the Model LI 50A-1, a high-frequency induction heating unit

Lindberg Model LI-50A-1 High-Frequency
Induction Heating Unit



which is said to be capable of providing 50 kw. at 400,000 cycles per second on a 100 per cent duty cycle has been announced by Lindberg Engineering Co., 2469 W. Hubbard St., Chicago 12, Ill. The unit, which has an output of 2,840 B.T.U. per minute, is said to be ideal for heating and fabricating operations which call for production brazing, soldering, hardening, forging, or shrink fitting.

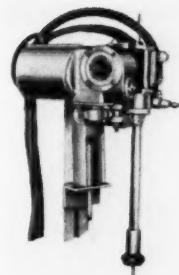
The Model LI-50A-1 features a built-in closed water system that circulates temperature-controlled water to the oscillator tube and tank coils. Average water consumption at full load is 22.5 g.p.m. at pressures ranging from 20 to 80 lb. The cabinet is constructed of heavy gauge steel, and the unit measures 96 inches wide x 68 inches deep x 80 inches high overall.

Equipment Replaces Galvanized Surfaces on Butt-Welded Parts

Metallizing Company of America, 3520 W. Carroll Ave., Chicago 24, Ill., has developed equipment for recoating parts where the galvanized finish has been burned off during butt welding due to the

high welding temperature. According to the manufacturer, the equipment, which is designed for attaching to the forming and butt-welding machine, stops and starts with the welding and forming equipment and is positive in application.

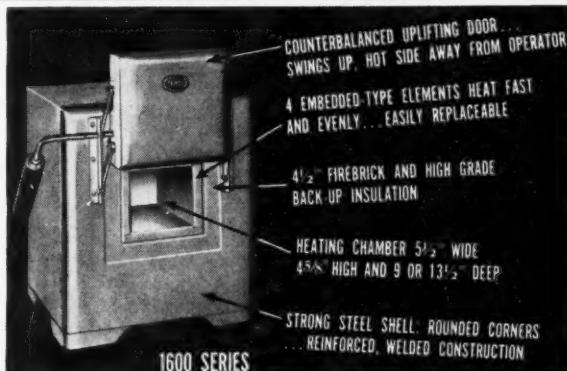
The speed of replacing the coating, it is claimed, is set to conform with the forming and welding equipment used, the average being 100 feet per minute. However, the speed can be greatly increased or decreased to correspond with manufacturing speeds. Designed primarily for use on round tubing and containers, the equipment is said to be adaptable to various applications where it is desirable to fabricate from galvanized material.



Equipment used to replace galvanized coating on butt-welded parts

solve heat-treat problems

with versatile
Temco bench-
type furnace



Step up production, cut costs with Temco electric furnaces for heat treating dies, parts, tools, etc. Model illustrated above one of eight convenient sizes available with either electronic or manual temperature controls. Economical, easy

to install and operate, low cost. Priced from \$55.00 to \$507.50. Write for literature and nearest dealer's name.



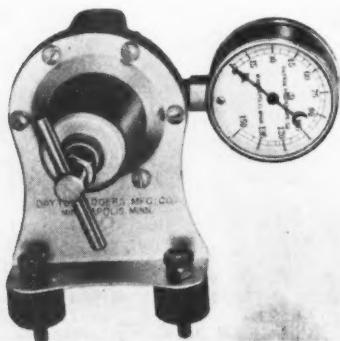
ELECTRIC
FURNACES

THERMO ELECTRIC MANUFACTURING CO.

• 488 HUFF ST., DUBUQUE, IOWA

Reducing Regulating Valve

A combination reducing regulating valve and pressure gage which is said to



Dayton Rogers Combination Reducing Regulating Valve and Pressure Gage

accurately regulate all secondary pressures up to 150 lb. has been announced by Dayton Rogers Mfg. Co., Minneapolis 7, Minn. Designed for a variety of compressed air purposes, the unit is avail-

able in $\frac{1}{4}$, $\frac{3}{8}$, $\frac{1}{2}$, and $\frac{3}{4}$ -inch pipe size connections, and is provided with a special metal bracket and two vibration dampeners which minimize shock.

According to the manufacturer, the regulating valve reduces the shop air line (primary pressures) to the lower desired (secondary pressures) automatically, thus maintaining the pressures with minimum attention. The pressure gage records the primary pressure used on the piece of equipment at the point of operation. The unit can be furnished with or without the pressure gage.

Punch Press Feeder Redesigned to Broaden Application

Designated as the "Feed-O-Matic" F-3, a mechanical punch press feeder which has been redesigned to broaden its application in secondary die work and to permit its use for parts transfer operations not connected with punch presses has been announced by The V & O Press Co., Division of Emhart Mfg. Co., Hudson, N. Y. The feeder is said to be equipped so that the pickup can be timed to coincide with the completion of a production operation or with the arrival of the part at a predetermined location. The

Punches Shaped from the SOLID with OTTMANN Punch Shaper

FEATURES:

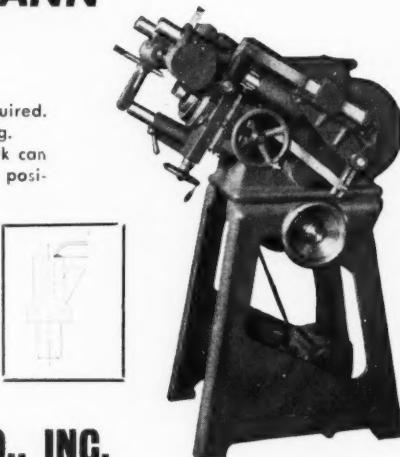
1. No holder plates required.
2. Simple work mounting.
3. No re-setting — Work can be adjusted to any position of tool.
4. Forms shaped accurate. Parallel and true.
5. Minimum hand work.
6. Convenient, simple operation. Uses standard shaping tools.

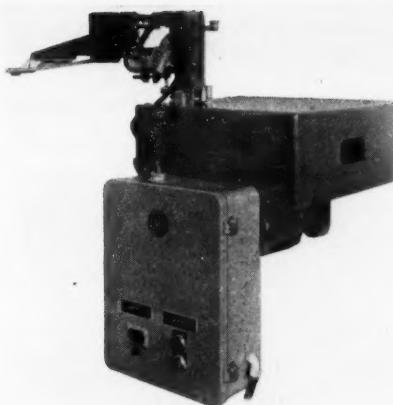
Write for Literature

CEDAR-WEST TOOL CO., INC.

90 WEST ST.

NEW YORK 6, N. Y.





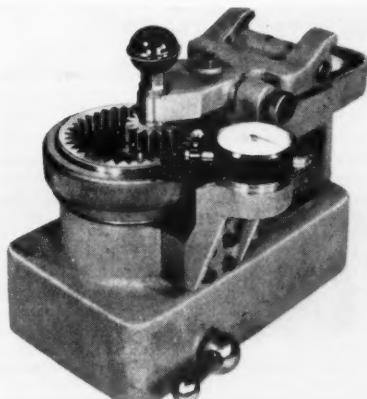
V & O "Feed-O-Matic" F-3 Mechanical Punch Press Feeder

Model F-3 is designed to provide direct vacuum pickup for flat parts, vacuum controlled grip fingers for pieces that have different planes, and, in special applications, a magnetic pickup of parts.

Internal Gear Rolling Fixture

Designated as the Model 702, a bench-type internal gear rolling fixture that is designed to check size, eccentricity, and

Michigan Model 702 Internal Gear Rolling Fixture



For Performance That Pays Profits . . . BUY BRADFORD TOOLS

Here is more drill for less cost! The Bradford Model 10 is precision-built and balanced right for easy drilling in any position.



Integrally cast back handle is in direct line with chuck and bit for accurate work. Powered by a ball bearing, 450 r.p.m., 110-volt AC/DC motor. Weighs only 8 lbs. Ideal for general shop drilling work.

BRADFORD HEAVY DUTY GRINDERS

A complete line of bench, pedestal and portable grinders, better-built to give years of outstanding performance on the most rugged kinds of external grinding and tool sharpening work. Made in 1, 2, 3 and 5 h.p., with push-button switch on 1 h.p., overload protection on 2 h.p. sizes and up.



Get the tools that do the job —faster, better, at less cost. Specify Bradford Tools. See your Bradford dealer or write for complete information.

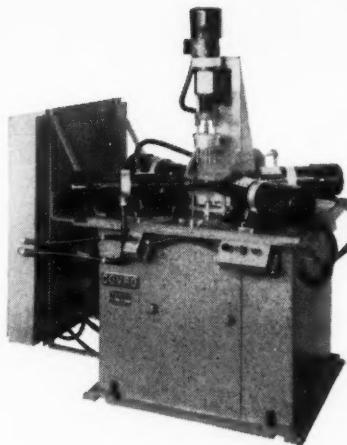
The **BRADFORD MACHINE TOOL CO.**
658 Evans St. Cincinnati, Ohio
Precision Since 1840

roll smoothness, as well as face runout, has been announced by Michigan Tool Co., 7171 E. McNichols Rd., Detroit 12, Mich. The rolling fixture is available in three sizes; namely, the Model 702-A for gears up to 4 inches o.d.; Model 702-B for gears up to 7 inches o.d.; and Model 702-C for gears up to 12 inches outside diameter.

The fixture features a heavy cast iron base, scraped ways, and hardened and ground ball ways. The gear rolling fixture varies in size from the Model 702-A which is $6\frac{1}{4}$ inches wide x $10\frac{3}{4}$ inches long x $10\frac{3}{4}$ inches high to the Model 702-C which is $7\frac{1}{2}$ inches wide x $17\frac{1}{2}$ inches long x $13\frac{1}{2}$ inches high. According to the manufacturer, the fixture may be used in conjunction with the Michigan Model MTR-50 Automatic Recorder to record all records on permanent charts.

Machine Simultaneously Drills Seven Holes

A machine which is designed to drill seven holes simultaneously and ensure the proper location of the holes in the pieces being drilled has been announced by Govro-Nelson Co., 1933 Antoinette, Detroit 8, Mich. The machine incorporates



Govro-Nelson Drilling Machine incorporating six Model KH automatic drilling units for drilling seven holes simultaneously

six Model KH Govro-Nelson self-contained automatic drilling units.

The accompanying illustration shows

SALVAGES MILLING CUTTERS SHARPENS SAWS IN GANGS



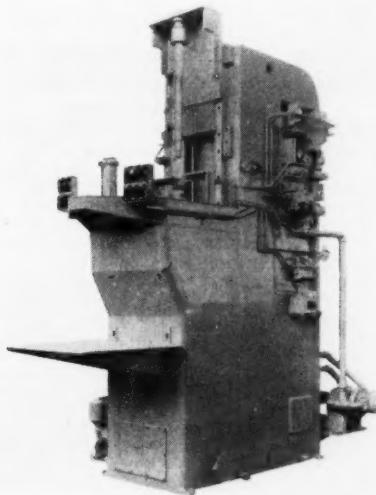
This low cost straight flute grinder sharpens milling cutters and circular saws. Automatically indexes a gang of saws, one row of teeth at a time and sharpens them with an accuracy of plus or minus .001" for the entire lot. Salvages milling cutters and saws that might otherwise be scrapped. Write for literature on 57T automatic grinder. **The Wardwell Mfg. Co., 3166 Fulton Road, Cleveland 9, Ohio.**



the machine arranged to drill five radial holes and two parallel holes simultaneously in an aluminum part at a rate of 500 parts or 3,500 holes per hour. In operation, the operator loads the part and touches the start button, whereupon the part is automatically clamped, drilled, and unclamped.

Pull-Down Broaching Machine Utilizes Interchangeable Tooling

Designated as the Model PD-5-25-48, a pull-down broaching machine which



American Model PD-5-25-48 Pull-Down Broaching Machine

utilizes interchangeable base fixtures and tooling for broaching round and serrated holes in heavy and hard-to-handle parts has been announced by American Broach & Machine Co., 415 W. Huron, Ann Arbor, Mich. The machine incorporates a machine slide and a retriever slide which move on the same ways. The retriever guides the rear portion of the broach through the major portion of the cutting stroke. An electrical interlock between the retriever and machine cycle automatically stops the cycle if the pull head should fail to connect with the broach. A hydraulic receding work slide, also interlocked to the machine cycle, facilitates loading and increases productivity.

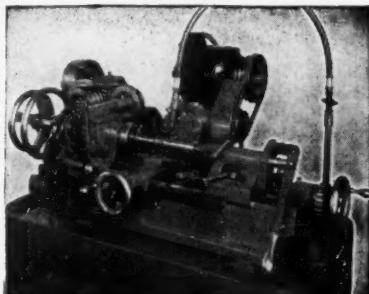
BLANKING, NOTCHING, PARTING, EMBOSsing?

- **FAST DIE CHANGES,**
with standard
Punches
and Dies.
- **15 Ton**
capacity.
- **6"** throat depth
permits
reaching to
center of
12" piece.
- Large Punch
Plate and
Bed permits
blanking
over big
areas.
- Patented Leaf Assembly provides positive
punch and die alignment.
Diagram illustrates versatility of Press—
each blanking done with 1 stroke.



LESLIE WELDING CO., 2940 Carroll Ave., Chicago 12

WALTHAM



THREAD MILLING MACHINE

Also Pinion and Gear Cutting Machines,
Cylindrical Sub-Presses, Cutter Sharpening
Machines, Small Special Machinery. Cutters
for thread milling and gear cutting.

Write for illustrated bulletin.

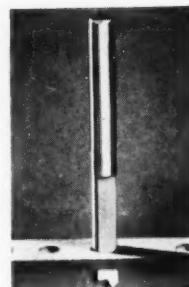
WALTHAM MACHINE WORKS
WALTHAM

"Super Hard" Drills Now Offered in Additional Standard Sizes

Super Tool Co., 21650 Hoover Rd., Detroit 13, Mich., has increased the range of standard sizes in its line of "Super Hard" Carbide Drills which are specially designed for drilling hardened steel. The drills are now available in all sizes ranging from $\frac{1}{8}$ to $\frac{1}{2}$ inch in the standard round-shank style (solid carbide end) and in 10 sizes ranging from $\frac{1}{16}$ to $\frac{3}{4}$ inch in the hex shank (carbide-tipped) style.

The drills feature a long carbide end

which, it is claimed, tends to dissipate the heat developed at the cutting end as it approaches the point of braze and minimizes the danger of b r a z e failure. According to the manufacturer, the drills are designed for drilling tools, dies, fixtures, and so on, that require corrections after hardening.



"Super Hard" Carbide Drill

Why THOR STAMPS Last Longer



... because they're made of a special, correctly-heated alloy steel. Central striking point assures uniform marking. Thumb side marking assures easy use.

You get more mark per dollar with THOR STAMPS. Write for catalog and prices.

The Pittsburgh Stamp Co., Inc.
612 CANAL ST. • PITTSBURGH, PA.

Lead Screw Tapping Attachment Has Variety of Split Nuts and Matching Lead Screws

Designated as the "Auto-Tap," a lead screw tapping attachment which has a variety of split nuts and matching lead screws available in different pitches to suit a wide range of tapping requirements has been announced by Automatic Methods, Inc., Room 188, 42 Walnut St., Newark, N. J. The unit can be attached by means of a support arm to 14 or 15-inch drill presses having a $2\frac{3}{4}$ -inch diameter column. The attachment is held in the chuck of a reversing head, and the lead screw and nut through which it passes controls the drive of the tap. The split nut and matching lead screw prevent greater or lesser exertion on the part of the operator from being passed on to the tap, thus taking the load and strain from the tap.

A variety of pitches, including 20, 24, 28, 32, 36, 40, 44, 48, 56, and 64, are available, and the split nuts with lead screws may be furnished as separate units in any quantity or size. Special pitches and spe-

SUPERREAM

REAMERS IN Decimal SIZES

▼ FROM .032 all the way up—Blanks can be ground to your exacting specifications and delivered in approximately 10 days. By purchasing SUPERREAM REAMERS in steps of .001 you SAVE—Time, Labor and Money in the cost of extra machining and lapping. SUPERREAM REAMERS all have ground and polished flutes and are held within .0002 tolerance.

REAMERS are also furnished in Right-hand spiral, right-hand cut, as well as Left-hand spiral, right-hand cut.

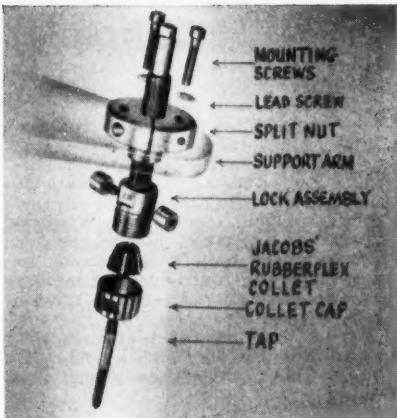
- In Emergency phone
Libertyville 2-4200



**TWENTIETH CENTURY
MANUFACTURING CO.**

Route 176 and Bradley Rd., Libertyville, Ill.

Write for descriptive literature and prices.



"Auto-Tap" Lead Screw Tapping Attachment

cial sizes of support arms can be supplied on special order to meet user specifications.

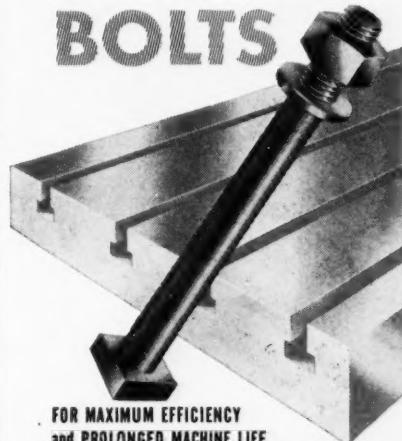
Pigment-Free Die Lubricant Is Said To Reduce Welding and Pickup

Designated as Metalloid X-60, a drawing compound which is said to minimize heat generated that causes welding and pickup and to provide unusual surface finish has been announced by The Metalloid Corp., Huntington, Ind. According to the manufacturer, the active ingredients in the compound unite with the atoms in the workpiece to normalize the stressed section, and the lubricant becomes active at a temperature of 550 deg. F., well below the critical temperature of dies and workpieces.

Metalloid X-60, it is claimed, will not deposit or gum on presses or ways, has a pH of 7, and will not break down. Applications for X-60 in drawing operations include all conventional metals from 1010 low carbon steel to stainless, including numerous non-ferrous materials. Recommended lubricant application is to the blank prior to the first draw and after annealing in a multi-stage draw. The compound can be applied by dipping the blank or shell or may be atomized or sprayed on male and female dies, as so desired.

November, 1952

BOYAR-SCHULTZ *Precision-made* ALLOY STEEL SPECIAL MACHINE BOLTS



FOR MAXIMUM EFFICIENCY
and PROLONGED MACHINE LIFE

It does not take long to ruin the accuracy of costly machine tools when poorly made, soft steel bolts of ordinary manufacture are used.

Boyar-Schultz SMB Bolts are precision made with heads at right angle to bodies, carefully machined to present a broad, flat surface to the upper surface of the T-slots. They are made from alloy steel forgings, heat treated for maximum properties and are tough and hard. Threads, class 3 fit will not easily strip or distort. SMB Nuts and Washers are specially made to give best results with SMB Bolts.

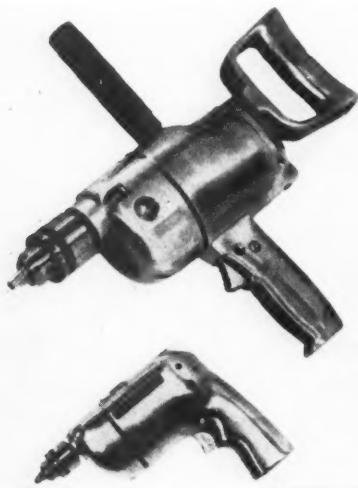
When compared with refinishing and trueing the bed of a machine tool, the cost of GOOD bolts is trifling.

WRITE FOR FREE CATALOG

BOYAR-SCHULTZ CORPORATION
2120 Walnut Street, Chicago 12, Ill.

Electric Hand Drills Are Designed for General and Special-Duty Operations

Two electric hand drills, designated as the "General Duty" Model 107 and the "Special Duty" Model 109, have been an-



(Above) Porter-Cable "Special Duty" Model 109 Hand Drill. (Below) Porter-Cable "General Duty" Model 107 Hand Drill

nounced by Porter-Cable Machine Co., 5163 N. Salina St., Syracuse 8, N. Y. The Model 107 incorporates a $\frac{1}{4}$ -inch chuck and is designed for all-around intermittent use in shops, and so on. The drill has a full-hand pistol grip with a push-button lock. Compound reduction gears are said to deliver maximum power to the

spindle. The unit has an idle speed of 2,000 r.p.m. and is capable of drilling within $\frac{3}{4}$ inch of a parallel surface. The tool measures $8\frac{1}{4}$ inches long x $2\frac{3}{4}$ inches wide and weighs 3 lb. 6 ounces.

The Model 109 has a $\frac{1}{2}$ -inch chuck and is designed for intermittent production use where power is needed. The tool has an idle speed of 450 r.p.m. and is capable of drilling within $1\frac{1}{4}$ inches of a parallel surface. The drill incorporates a spade handle at the rear which can be changed to a vertical or horizontal position, or removed entirely. A removable auxiliary handle which can be mounted on the top or side of the drill enables the operator to increase pressure and control torque. The unit measures $10\frac{3}{4}$ inches long x $3\frac{3}{4}$ inches without the rear handle and weighs 9 pounds.

Cement Designed for Locating and Retaining Drill Jig Bushings

Designated as B-K No. 7, a cement which is said to locate and retain drill jig bushings without distortion of the jig plate or misalignment of the hole pattern has been developed by Sheridan Products, 1054 E. Hyde Park Blvd., Inglewood 3, Calif. The cement is said to be ideal for use in "master tooling" operations in the construction of complicated assemblies requiring irregularly shaped tools.

According to the manufacturer, the cement eliminates lapping of press fit bushings after assembly and is not affected by drilling heat. With the cement, bushings can be retained in steel, aluminum, or Fiberglas jigs. The cement is claimed to require a minimum of 2,000 p.s.i. to remove a bushing from a $\frac{1}{2}$ -inch steel plate. Mixing of the cement requires no weighing and can be done easily and quickly.

A Real Spring Winder!



Will earn its cost in one day. The Hjorth Perfection Spring Winder offers the

ideal means of winding extension, compression, torsion, taper, double taper, or left hand springs. Try one in your shop. You'll like it and the price is reasonable.

- No. 1 Capacity 0 thru $3\frac{1}{32}$ " wire \$1.50
- No. 2 Capacity 0 thru $3\frac{1}{16}$ " wire \$3.00
- No. 3 Capacity 0 thru $5\frac{1}{16}$ " wire \$5.00

HJORTH LATHE & TOOL CO.
10 BEACON STREET

WOBBURN, MASS.

HIGH SPEED DRILLS

FLAT TWISTED AND ROLLED SECTION



Special Lengths and Types
PROMPT DELIVERY

Manufacturers Since 1903

HI-DUTY DRILL WORKS
FLEETWOOD, PA.

NEW SHOP LITERATURE

Electrical Equipment. Electric Equipment Co., Division of Norry Electric Corp., 63 Curlew St., P. O. Box 51, Rochester 1, N. Y., has issued an eight-page catalog describing its lines of new and rebuilt motors, generator sets, transformers, Diesel motor-generator sets, compressors, controls, air and oil switches, platers, frequency changers, and starters which range from 1 to 3,000 h.p. in capacity.

Grind Bands. The DoAll Co., 254 N. Laurel Ave., Des Plaines, Ill., has issued a two-color illustrated bulletin (No. 49-810) which describes its "Line Grind" bands designed for use on band machines to machine hard materials, such as hardened steels and abrasive and brittle materials.

"**Building Your Career in Arc Welding**" is the title of an eight-page two-color bulletin (No. 416) released by The Lincoln Electric Co., Cleveland 17, Ohio. The bulletin describes the Lincoln School of Welding, the various courses given, and the school's facilities. The basic course at the Lincoln School consists of four weeks' training and practice, with a new class starting every week. The school is conducted as a service to industry.

and only a nominal charge for materials is made. Advance courses in special welding techniques, such as pipe welding and sheet metal welding, are also available.

"**Bliss Comparative Presses**," a 32-page pocket-size reprint of Section V of the "Bliss Power Press Handbook" released by E. W. Bliss Co., Canton, Ohio, presents a detailed comparison of press numbers, indicating identical sizes of Bliss, Toledo, and Consolidated presses. The booklet is designed to bring all owners of older models of Bliss presses up to date on the standardization of Bliss numbers.

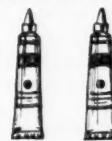
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OFFERS THIS COMPLETE LINE
TO DIAMOND COMPOUND USERS



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KITS

12 grit sizes made of precision graded pure diamond. Graded in accordance with U. S. Bureau of Standards requirements. For ease of identification, grit size is indicated by color of both paste and container.

For whatever you need in diamond compounds and accessories write Penn Scientific Products Co., 5941 Alma Street, Philadelphia 24, Pa.



ACCESSORIES

SPECTRUM

DIAMOND LAPING METHODS

Lathes, Drill Presses, Bench Shapers, and Accessories. An 88-page general catalog (No. 5205) issued by South Bend Lathe Works, 425 E. Madison St., South Bend 22, Ind., illustrates, describes, and provides specifications for the complete line of South Bend lathes, shapers, and drill presses, as well as its line of attachments, chucks, tools, and accessories. Several of South Bend's latest machine tool developments are featured for the first time, including a new type pedestal tool grinder plus many tools and attachments for South Bend lathes, drill presses, and shapers.



M - D Facing Heads With Automatic Feed

Can be attached to Boring Mill Bar, and Drilling or Milling Machine spindles. Single point tool travels radially, from center outward or reverse; feeds automatically. Sizes 6" to 46" diameter.

Write for circular.

MUMMERT - DIXON CO.
120 PHILADELPHIA ST. HANOVER, PA.

Hydraulic Cylinders. A 28-page two-color bulletin (No. 701) released by Lindberg Engineering Co., 2469 W. Hubbard St., Chicago 12, Ill., fully describes and illustrates its complete line of hydraulic cylinders available in capacities up to 1,500 and 3,000 p.s.i. Diagrams, photographs, and charts explain the different mounting types and capacities available.

Surface Grinder. A four-page illustrated bulletin issued by Morey Machinery Co., Inc., 410 Broome St., New York 13, N. Y., fully describes the German-made ABA Model FF-600 Precision Surface Grinder which incorporates a horizontal grinding spindle and hydraulic table feed, as well as manual operation, performing high precision work. Complete specifications are included.

Bushings. A 24-page three-color catalog (No. 10) released by Acme Industrial Co., 210 N. Laflin St., Chicago 7, Ill., describes and illustrates its line of Acme Standard and A.S.A. Standard drill jig bushings, liner and leader pins, liner and leader pin bushings, and dowel pins, as well as the company's specialized jobbing services. Complete specifications are included.

IT'S HERE! A LOW PRICE *Automatic COIL CRADLE*

Medelton
Motor
Driven

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\$270.00
F.O.B. N.Y.
800 LBS. CAP.



\$357.00
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2000 LBS. CAP.

FEATURES . . .

- Eliminates hazards of lifting heavy rolls.
- Roll on your coil and it's ready to go.
- Slack loop prevents drag on feed or dies.
- 30% to 40% higher daily production on hand or automatic feeds.
- Re-loading time kept to a minimum.
- No pulling of coils, avoids operator's fatigue, and results in faster feeding.

Write for circular. • Dealer inquiries invited.

WM. HALPERN & CO., INC.
Machine Tools

SPARK PLACE 245 CONNECTICUT AVE.
NEW YORK 7, N. Y. BRIDGEPORT, CONN.

"Life Is Good in Kalamazoo." In celebration of its 70th anniversary, Hammond Machinery Builders, Inc., 1615 Douglas Ave., Kalamazoo, Mich., has released a booklet entitled "Life Is Good in Kalamazoo" which deals primarily with living in Kalamazoo and graphically and pictorially tells of the many and varied industries which are located in the community. The booklet says relatively little about the company's past or its products, but fully presents the City of Kalamazoo in text and picture in such a manner that it should prove interesting to any reader regardless of whether he is engaged in management, engineering, production, advertising, or, in fact, no matter what he does.

Sheet Materials Handling Equipment. An eight-page two-color bulletin issued by Fried Steel Equipment Mfg. Corp., 528 E. 119th St., New York, N. Y., describes and illustrates its line of sheet materials handling equipment, including the "Stripveyor," which is said to automatically pick up and carry strips beyond the shear bed, and the "Liftveyor," which permits clean-cut wide shearing to 0.005 inch and then conveys sheets beyond the shear frame.

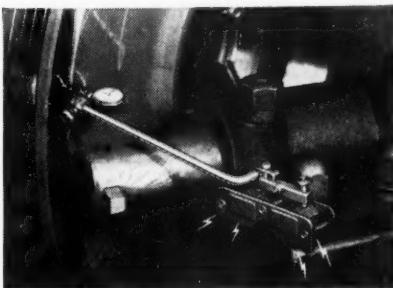
Flotation Units. A case history of a central flotation system for clarification of soluble coolant at the General Railway Signal Co., Rochester, N. Y., is contained in a four-page two-color illustrated catalog issued by U. S. Hoffman Machinery Corp., Industrial Filtration Division, 219 Lamson St., Syracuse 6, New York.

Chuck Tools. A 52-page bulletin (No. 17-50) prepared by Scully-Jones & Co., 1909 S. Rockwell St., Chicago 8, Ill., describes and illustrates "Roll-Lock" chucking tools which utilize a new holding method that takes advantage of the elastic properties in metal. Standard stock sizes of "Roll-Lock" mandrels, arbors, and chucks are listed, and the tools and their applications are fully explained. Dimensional diagrams are included.

Pilot Bearing Bushings. A four-page two-color catalog released by The J. G. Jergens Co., 11106 Avon Ave., Cleveland 5, Ohio, describes and illustrates its pilot bearing bushings which are said to provide an absolute seal against coolants and fine powdered dust and grit. Cut-away illustrations, dimensional drawings, and specification tables are included.

Save Up To ½ Hour Per Job

With The Complete Line of Magnetic Base Units and Accessories



Erick Magna Holder No. 200B illustrated as used in truing up work in lathe. This can save an hour or more, depending on the job. Magnetic base has powerful 50 lb. pull. Holding rod is set in ball socket allowing universal settings. Note exclusive precision adjustment controlled by thumb screw enabling operator to make minute adjustments of Indicator against or away from work without touching holding rod or indicator.

Model 100B Erick Magna Holder for Indicators—Price \$3.95

Model 200B Erick Magna Holder for Indicators, with precision adjustment (illustrated)—Price \$5.45

Model 300 Erick Magna Holder for Indicators up to 3" in diameter for use as lathe stops—Price .. \$2.95

Model 400 Erick Safety Shield 5" x 7" plexiglass—for use with either Model 100B or 200B Erick Magna Holder \$3.50

Model 500 Erick Safety Shield 8" x 10" plexiglass—for use with either Model 100B or 200B Erick Magna Holder \$4.25

Model 600 Erick Magna Holder Inspection Light—25 Watt \$6.50

Model 700 Erick Magna Holder for Flashlights and Drop Cord Lights... \$3.50

Model 800 Erick 4X Magnifying Glass, for use with either Model 100B or 200B Erick Magna Holder. \$4.25

Does away with hap-hazard clamps or special attachments. Proved by thousands of satisfied users in all types of industry!

Look for our complete tool chest display at your leading mill or hardware dealers. If your dealer cannot supply, order with name of dealer or write for Bulletin No. 752 showing each unit in use.

CULLEN MANUFACTURING COMPANY - - - - Racine, Wisconsin

GAMMONS

TAPER REAMERS

for all types of die work



- Specially treated for modern die steels.
- Rapid cutting capacity.
- Large range of standard sizes.
- Tapers per inch: .005, .008, .013.

Write for
data sheets.

GAMMONS • HOAGLUND CO.
MANCHESTER 2,
*Manufacturers of helical taper pin, chucking,
die makers and special reamers.*

American Pattern Files. The DoAll Co., 254 N. Laurel Ave., Des Plaines, Ill., has released a six-page two-color bulletin (No. 51-801) which describes and illustrates its line of American Pattern files for industrial use. Information regarding the use and application of each particular type file is included.

Diamond Wheels and Hones. A 32-page catalog (No. 3) released by Diamond Tool Research Co., Inc., 305 E. 45th St., New York 17, N. Y., presents list prices and specifications for its line of diamond wheels and hones available in a wide variety of diameters ranging from $\frac{1}{8}$ to 8 inches, grits, diamond depths, and concentrations. Information on how to order and how to use the wheels, as well as dimensional diagrams, are included.

Sprockets. A 12-page two-color catalog issued by Cullman Wheel Co., 1344 Altgeld St., Chicago 14, Ill., describes and illustrates its line of "Grip-Master" sprockets which are available in pitches ranging from $\frac{5}{8}$ to $1\frac{1}{4}$ inches. Complete specifications and dimensional diagrams are included.

Thread Generating Machine. An eight-page two-color bulletin released by George Scherr Co., Inc., 198A Lafayette St., New York 12, N. Y., describes and illustrates a new model of the Cornelis Thread Generating Machine which is intended for cutting screw threads, lead screws, and worms by an improved generating method. Complete specifications are included.

Electric Impact Hammer. Black & Webster, Inc., Dept. N80, 445 Watertown St., Newton 58, Mass., has released a data sheet folder which explains the operating features of the "Electropunch," an all-electric impact hammer designed to perform staking, riveting, marking, swaging, cutting-off, crimping, bending, punching, dimpling, and other operations where a lightning-fast blow is required. Several accessories for the hammer are also described.

Band Sawing Machines. A four-page two-color folder issued by W. F. Wells & Sons, Three Rivers, Mich., describes and illustrates the Model J-24 Metal Band Sawing Machine which has a capacity of 24 x 24 inches. Other available models are also discussed and illustrated. Specifications for all models are included in the folder.



**"More than 98%
of our 27,000 employees
have enrolled in the
Payroll Savings Plan."**

JOHN E. GOBLE
President, National Tube Division
U. S. Steel Corporation

"We of the National Tube Division of the United States Steel, recognize that systematic saving through the Payroll Deduction Plan is an investment in the security of the Nation, as well as of the individual. We are proud of the participation resulting from a person-to-person canvass in our plants and offices. More than 98% of our 27,000 employees have enrolled in the Payroll Savings Plan—a complete affirmation of their faith in America. Such personal savings are the backbone of our free enterprise system."

Concisely, clearly, Mr. Goble cites two of the reasons why 98% of the 27,000 employees of National Tube are enrolled in the Payroll Savings Plan:

- recognition by management that the Payroll Savings Plan contributes "to the security of the Nation as well as of the individual."
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MODERN MACHINE SHOP

Internal Grinding Wheels. A four-page three-color illustrated bulletin (Form ESA-29) issued by Simonds Abrasive Co., Philadelphia 37, Pa., describes internal grinding wheels which are available in standard sizes and shapes up to 2½ inches in diameter. Grain and grade recommendations for industrial grinding various materials are included.

Copper-Clad Steel. A four-page heavy-paper covered booklet issued by Lukens Steel Co., 517 Strode Ave., Coatesville, Pa., discusses in detail a copper-clad steel which is said to combine the specialized corrosion resistance and the electrical and thermal conductivity of solid copper with the strength, rigidity, and economy of steel.

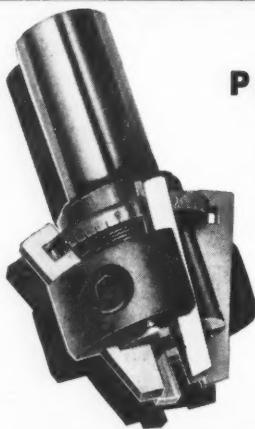
High-Speed Milling Machines. A four-page two-color bulletin (No. 1139) released by Onsrud Machine Works, Inc., 3924 Palmer St., Chicago 47, Ill., describes and illustrates its high-speed vertical and horizontal milling machines designed for milling aluminum and related non-ferrous metal alloys. Dimensional diagrams and specifications for each model are included in the bulletin.

"**Life was like that . . . Before Broaching**" is the title of a 36-page gold-covered booklet published by The Lapointe Machine Tool Co., Hudson, Mass., in recognition of the 50th anniversary of broaching, as well as the 50th anniversary of the company. Photographs of early models of Ford, Cadillac, and Chrysler automobiles; the John Deere "Waterloo Boy" Tractor; and the original track-type tractor built by Caterpillar are shown, as well as a picture of the Wright Brothers' flight at Kitty Hawk in 1903. Some very old Lapointe broaching machines, broach sharpeners, and so on, are also shown. The latter part of the booklet is devoted to the newly remodeled and enlarged Lapointe plant at Hudson, Massachusetts.

"**Why Taps Should Be Sharpened Precisely**" is the title of an article reprint released by Edward Blake Co., 438 Cherry St., West Newton 65, Mass. The reprint includes several charts and diagrams illustrating the principles and operation of precision tap sharpening. The text of the article presents detailed facts and figures which are designed to help manufacturers evaluate the precision sharpening method for use in their own plants.

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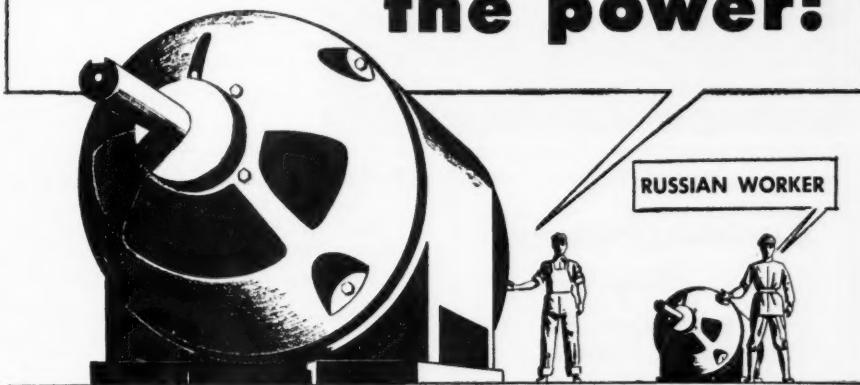
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Lubricant. A six-page two-color bulletin (No. 96) describing the use of "Molykote" Type A as an effective lubricant for helping to overcome the energy waste in internal combustion engines is now being offered by The Alpha Corp., 179 Hamilton Ave., Greenwich, Connecticut.

Millers, Lappers, Grinders, and Broachers. A 52-page two-color 1953 General Catalog (Publication No. M-1776) released by The Cincinnati Milling Machine Co., Cincinnati 9, Ohio, fully describes and illustrates its line of machines for milling, lapping, grinding, broaching, diesinking, metal forming, flame hardening, and cutter sharpening, as well as grinding wheels and cutting fluids. Complete specifications are included.

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Self-Locking Nuts. A 26-page two-color catalog released by Standard Pressed Steel Co., Box 556, Jenkintown, Pa., describes and illustrates its line of "Flexloc" Thin Locknuts designed for aircraft and commercial use. Sizes, fits, part numbers, dimensions, tensile values, materials, packing quantities, and weights of the various type nuts are listed.

Jet Blade Contour Grinder. A four-page two-color bulletin (No. CGQ-52) released by Landis Tool Co., Waynesboro, Pa., describes and illustrates a contour grinder which is designed to uniformly grind five surface elements of jet blades and buckets in one continuous operation. Information on features and construction, as well as complete specifications, is included.

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the "Where to Get It" section of MODERN MACHINE SHOP, originated in February, 1940, provides a quick reference to machinery, tools and supplies advertised in the current issue. Use it consistently. You'll find it's very helpful. (See pages 432, 434, 436, and 438.)

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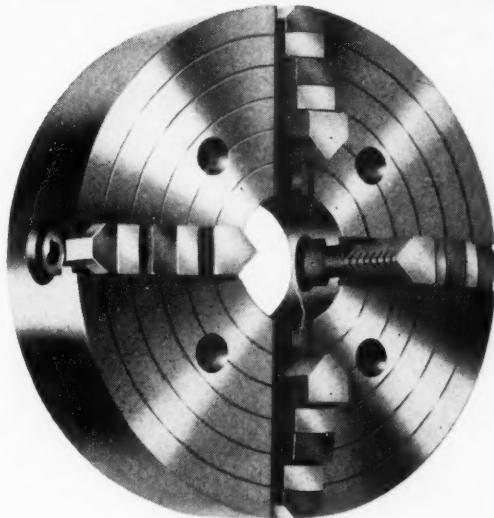
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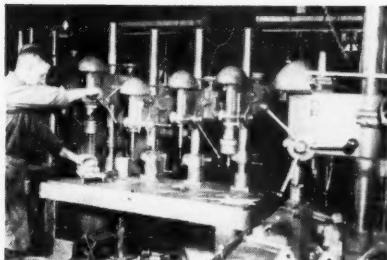


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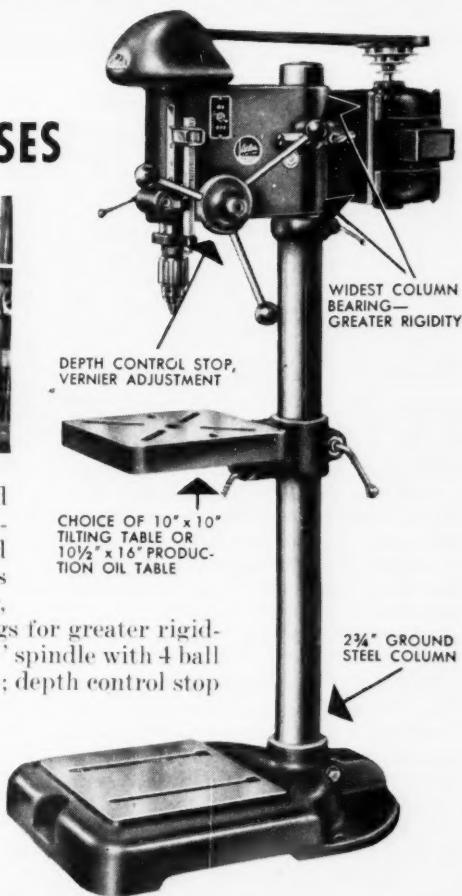
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the last word

What's Happened to Prices?

DURING the last twelve years, prices have become about twice as "high." What is a high price? It is a measurement in dollars of how much things cost us, and in terms of dollars, prices are certainly high. But what is a dollar? If we take a closer look, we may find that prices haven't really gone up at all. Let's see what has happened in terms of labor and income.

In 1939, a man who worked making automobiles and received \$33.00 a week could buy an automobile with about 29 weeks' work. In 1952, a man who works making automobiles and receives \$80.00 a week can still buy an automobile with about 29 weeks' work. The price of the car has gone way up, but in terms of work its cost is about the same. In fact, were it not for exceptionally high taxes which raise the cost of everything, this automobile worker would get the car for fewer weeks of work.

How did all these price increases happen? We have been monkeying with the American dollar. This practice is called inflation which means increasing the supply of money at a time when there is no corresponding increase of things to buy with it. Money is funny stuff: it is hard for most of us to realize that a dollar isn't anything but what it will buy. For that reason, as our incomes have gone up, up and up, our optimism and feeling of prosperity have gone up with it. "We never had it so good" is the common reaction to all these extra dollars in the pay envelope. That is why we can't quite understand

why we are not actually much better off.

How does inflation start? Where does the extra money come from? Most of it is not money in the sense of being dollar bills: it is seen only in the form of bank checks. This money comes from the commercial checking banks which have the legal right to create brand new extra money and loan it out with interest. You, yourself, could start a tiny bit of inflation by going to a bank and borrowing some money with which to buy some furniture. When you got the loan (which would be called a bank deposit), the money supply of the nation would be inflated by that amount, and when you pay it back, the money supply of the nation would be deflated by that amount.

But the private citizens of the United States are not the ones who started this inflation. It was the people in Washington, Government people, who were too timid to tax us the full cost of government. It is not hard for anyone to understand that when Government takes 25 or 30 per cent of the goods and services that the people produce, it might as well take 25 or 30 per cent of the money that the people earn. This would give the Government the money needed to buy the goods and services required to support the bureaus, the Army and Navy, and so on, without increasing the amount of money in circulation and more important, it would not increase prices.

But the people in Washington did not do this. They went to the commercial checking banks and caused them to create new unearned money amounting to

about \$100,000,000,000 (one-hundred billion dollars) and practically all of this is still in circulation. You might ask what the Government used for security against these loans. That is a good question: under the existing law, the government does not need anything as security for loans except its IOUs. This hundred billion was not "earned money." It did not represent the production of anything for sale. This point is very important, so let's spell it out. When we, the citizens, produce something and get paid for doing it, the money we get represents the thing we made and that money can be used to buy anything. But when extra unearned money is thrown into the market place, it has the same effect as counterfeit money. The price of everything goes up because there are too many dollars looking for too few goods. So as the Government spent the hundred billion dollars, prices went up and up, and as prices went up and up, wages had to go up and up, and

as wages went up and up, the cost of production went up and up. That is why things cost so much today and no price control on earth could have prevented it.

What can we do to get prices back where they were? We can't do much of anything and here's why. The only way to get prices back where they were, would be to get the money supply back where it was, which means that the Government would have to pay off its loans from the banks. The only way Government could do this is to get the money from us in taxes, and this we would not stand for and the Government knows it. So the best answer is this: stop inflation where it is and buckle down to the job of producing more things so that the supply of things for sale will gradually catch up with the inflated supply of money. If we were to do this, we could probably restore the 1940 value of the dollar by the year 1965. The big question is: will we do it?

American Economic Foundation

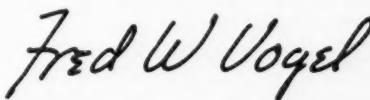
Foundation for Education and Research

DURING our tour of the Metal Show in Philadelphia last month we were noticeably impressed with a number of posters calling attention to the shortage of engineering students here in the United States and comparing our shortage with the known emphasis that Russia is placing on engineering education. Russia is reported to be turning out as many as 60,000 engineers per year while we in this country are faced with an ever dwindling number of young men—and women—who chose the engineering profession as a means of earning a living.

It is heartening, therefore, that we note that the American Society for Metals, in recognition of the great shortage of engineering students in the United States and the importance of metals research to the security of the free world, has voted the establishment of a Foundation for Educa-

tion and Research. Briefly, the assets of the Foundation each year will provide an income of approximately \$30,000 to be used for the advancement and dissemination of scientific knowledge, particularly with respect to the technology of metals, for the benefit of the public at large, either through education and research carried on by the Foundation or through the support of educational and research activities in established organizations and institutions.

The American Society for Metals is to be commended for its initiative and leadership in promoting this long-range, nationwide effort to keep strong the American economy's greatest industry and most important defense asset.



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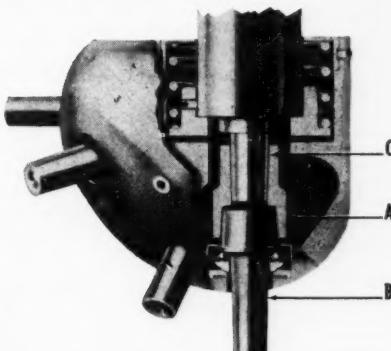
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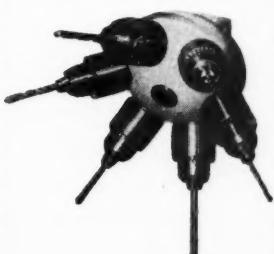


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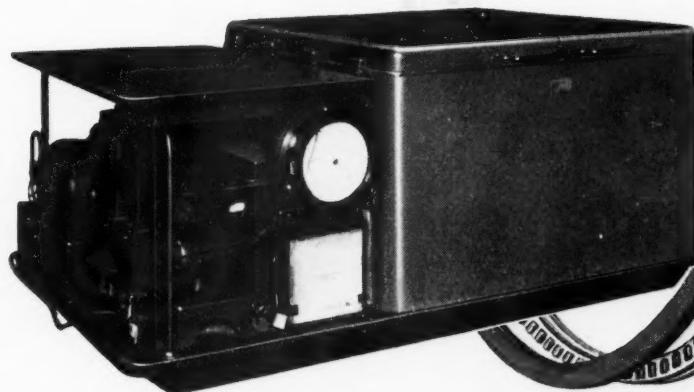
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Snow Mfg. Co.	223	Whistler & Son, Inc., S. B.	4
Somerset Tool Co.	240	White Dental Mfg. Co., S. S.	267
South Bend Lathe Works	40, 96	Whitney Mfg. Co., W. A.	387
Speedgrip Chuck	196	Whitney Metal Tool Co.	212
Standard Electrical Tool Co.	33	Whiton Machine Co.	355
Standard Gage Co., Inc.	193	Willey's Carbide Tool Co.	369
Standard Horse Nail Corp.	234	Wilson, K. R.	70
Standard Machine & Tool Co., Ltd.	343	Wilson Mechanical Instrument Co., First Cover	
Standard Pressed Steel Co.	286, 287	Winter Bros. Co.	164
Standard Shop Equipment Co.	373	Wirth & Son, Inc., Carl	428
Standard Steel Specialty Co.	359	Wisconsin Drill Head Co.	200
Staples Tool Co.	322	Woodson Tool Co.	252
Starrett Co., The L. S.	163	Woodworth Co., N. A.	283
Stearns Magnetic, Inc.	206	Zagar Tool, Inc.	312
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Sundstrand Machine Tool Co.	382		

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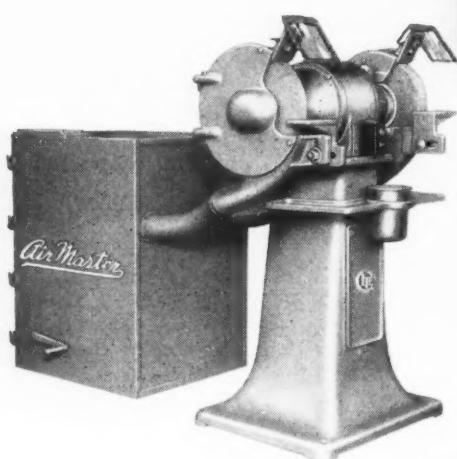
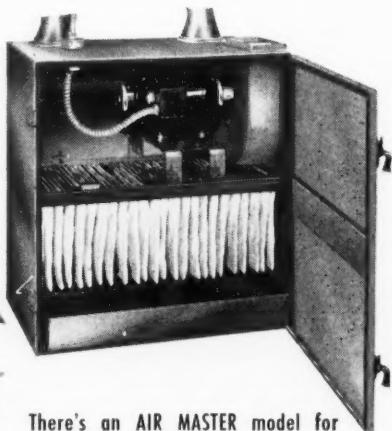
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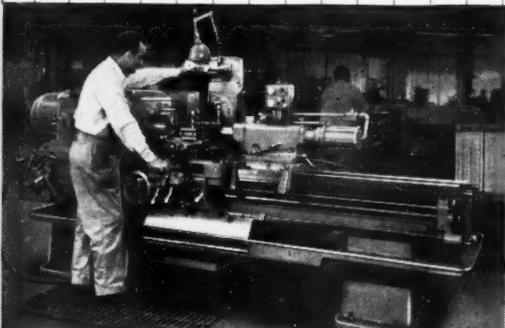
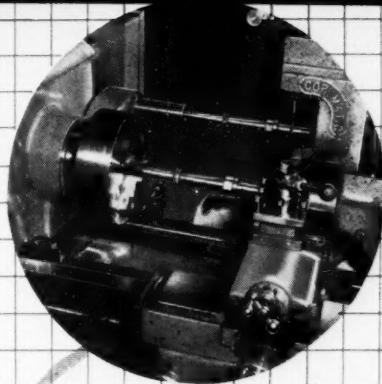
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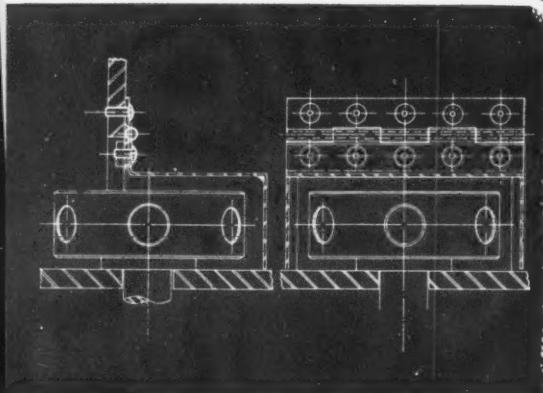
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